Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, May 2, 1925 (Issued Every Other Week) Volume XXVIII, No. 9

MEMBER A. B. C. *The Only Paid Circulation in this Industry* MEMBER A. B. P.

Printing of This Issue Is 5500 Copies. Next Issue Will Be May 16

Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS
Founded 1896

Volume XXVIII | Chicago, May 2, 1925 | Number 9

J. L. Shiely's New Sand and Gravel Plant

His No. 3 Plant Described Herewith Has Some Novel Features and Shows Progress

By Franklin A. Alter
Of Rock Products Staff

J. L. SHIELY, of St. Paul, Minn., has been in the sand and gravel business for a number of years, and in addition to this he is probably as well acquainted as anybody with the plants and methods of other producers, because of his visits from plant to plant in the interests of the National Sand and Gravel Association, of which he is treasurer. Consequently when it came time for his company to build a new plant he knew what was best adapted for his own particular locality. Taking his ideas as a basis, a plant was designed by C. S. Huntington of the Link-Belt Co., who has probably designed and built as many sand and gravel plants as any man in the United States. The result has been one of the most noteworthy plants built in 1924, as was mentioned in

J. L. Shiely

General view of the latest J. L. Shiely Co. sand and gravel plant near St. Paul, Minn.

ROCK PRODUCTS annual review of the sand and gravel industry, for although it resembles in outward appearance many other plants of Mr Huntington's design there are peculiar features that are decidedly novel.

Some Novel Features

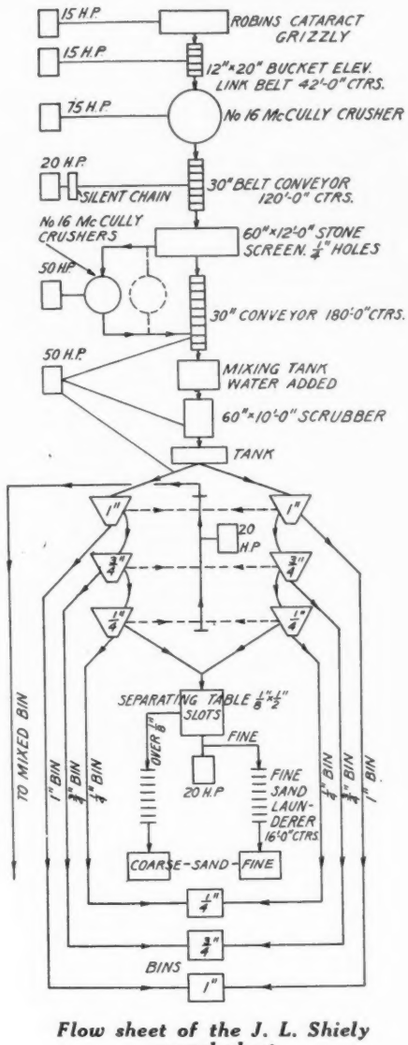
One of these is found at the start of the washing and screening process. The bank material, received in 2½-yd. side dump cars, is dumped on a Robins "cataract" grizzly set below the level of the ground. A grating of rails above breaks the fall of the material and spreads it out. The oversize of the grizzly goes to a bucket and belt elevator which lifts it to the hopper of a 16-in. McCully gyratory crusher. The undersize falls on a 30-in. conveyor that takes it to a 60-in.x12-ft. stone screen.

This conveyor is unusually driven. A Link Belt silent chain being used to connect it with the motor.

The stone screen has 1¼-in. perforations. The oversize goes to a 6-in. McCully gyratory which serves as a reduction crusher. A second crusher of this same type and size is being installed as the deposit has been found to contain more oversize than was anticipated.

The crusher discharge and the undersize of the screen are joined and carried on a 30-in. belt conveyor, 180 ft. centers, to the main washing and screening plant. This is set at right angles to the first conveyor. It discharges into a distributing box in which water is added.

From this box the material flows through a steel trough, which takes the place of a cast iron pipe originally installed, to the scrubber. The scrubber is 6 ft. in diameter and 12 ft. long and contains the usual baffles and lifters for holding a body of material which is turned over and over in the water as the scrubber revolves. It discharges into two lines of conical screens of the well-known Link-Belt type set above the plant bins. The first screen has 1-in. heavy perforated plates, the second has ¾-in. and the last ¼-in. openings. All screened products, including the oversize of the first screen, go to bins, except the undersize of the sand screen (¼-in. mesh) which goes to the "sand separating table."



Flow sheet of the J. L. Shiely gravel plant

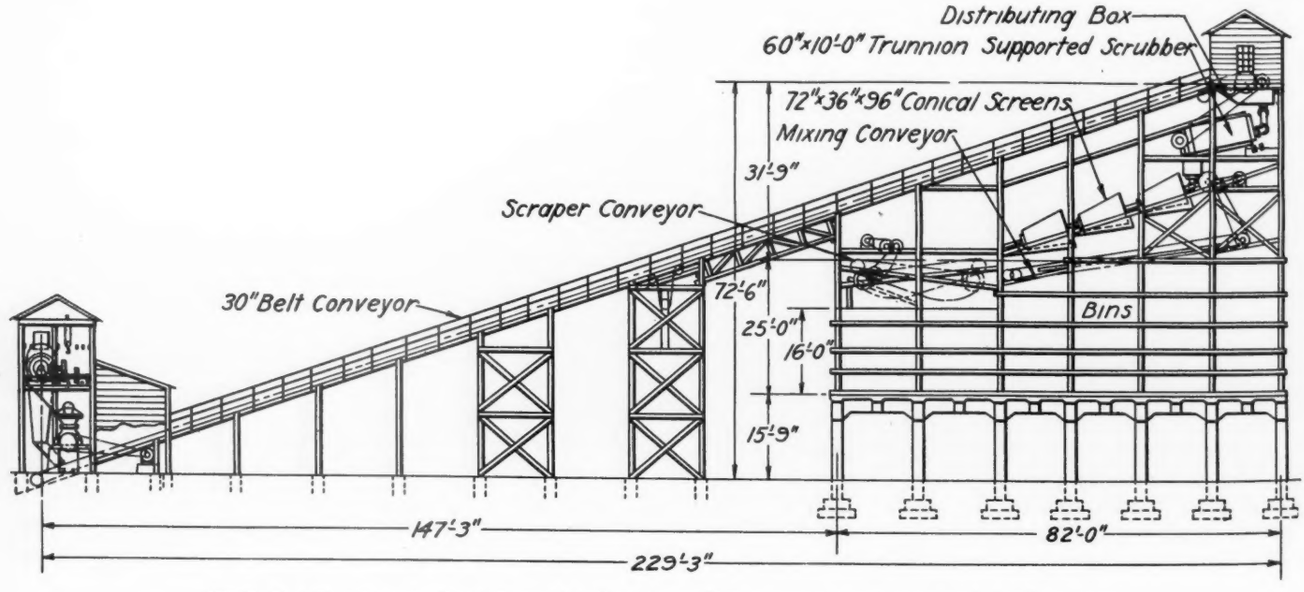
"Sand Separating Table"

This "sand separating table" is a rather flat gravity screen, with ½-in.x⅛-in. slots, over which the sand (and water) passes. Both products—oversize and undersize—go to sand dewatering boxes. These are 18 ft. long and fairly deep. A chain with steel flights passes through the box and the flights draw out the sand in a dewatered condition and deliver it to the bins. The loose side of the chain carries the flights that draw the sand from the box, as is the practice in ladder dredges and similar types of excavating devices.

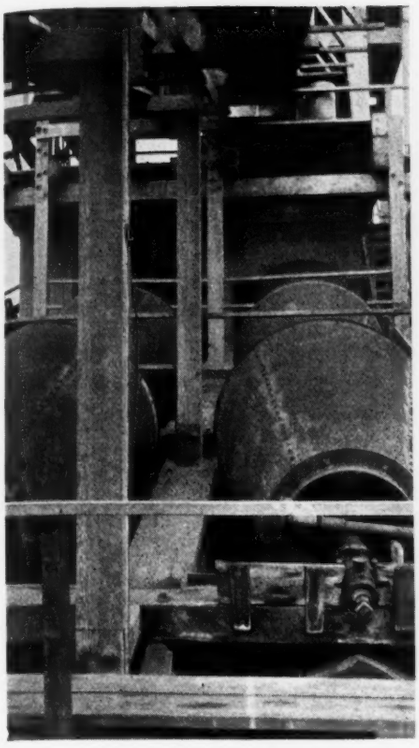
The bins are very well constructed of timber, framed and bound together by 6x10 and 6x12 waling strips from 4 to 6 ft. apart. They are set on a heavy reinforced concrete slab which is supported on concrete beams and columns.

About 2000 g.p.m. of water is required for washing and this is supplied by an Aurora deep well pump. The well hole is 20 in. in diameter and the pump shaft 160 ft. deep; a 4-stage pump is used. Power is from a 200-h.p. vertical motor.

The re-use of water is carried somewhat farther than is usual in sand and gravel plants, although this is principally to provide a reserve. There is a sump 150 ft. square and 50 ft. deep through which the waste water may be sent to settle out the solids. The overflow which is clear enough for washing purposes may then be returned to the plant by a centrifugal pump driven by a 75 h.p. Ideal motor. If anything goes wrong with the deep well pumping system this system of reusing water may be brought into play and will keep the plant going for several days, enough water being added from



Main details of new plant shown in elevation—Note scraper conveyor and its location



Battery of conical screens

the city mains to make up for losses.

Some of the motors in this plant were in use in the old plant. All those bought for the new plant are 3-phase, 60-cycle, 440-v. slip ring induction Fairbanks-Morse motors. A 15-h.p. motor is used for the cataract grizzly; the 16-in. gyratory has a 75 h.p. motor and the two 6-in. gyratories a 50 h.p. motor each. The screens and accessories are driven by another 50 h.p. motor. Drives are either direct or by chains, belt drives being used only on the crushers. Silent chain drives are used where they would be economical. Power is bought from a local company and comes in at 4000 v. and is transformed to 440 v. at the plant.

Conveyor Belt Tonnages Guaranteed

Conveyor belts are bought on a guarantee of tonnage and a rebate is claimed in case of belts that do not give the guaranteed service.

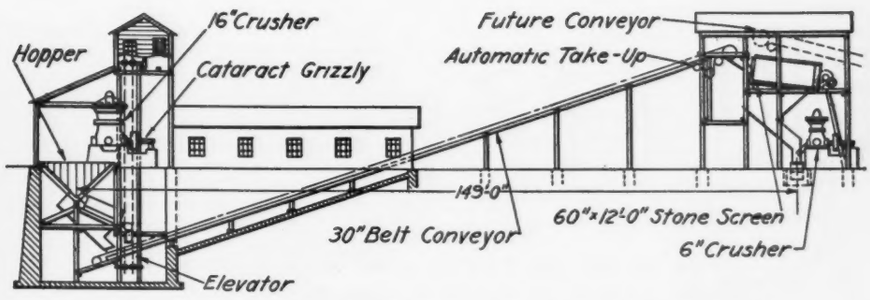
In working the deposit three Erie ¾ yd. steam traction type shovels are used and these load into cars of the company's own design and built in the company's own shops.

The bank as at present worked is 25 ft. high but the face will be carried 40 ft. high in the future.

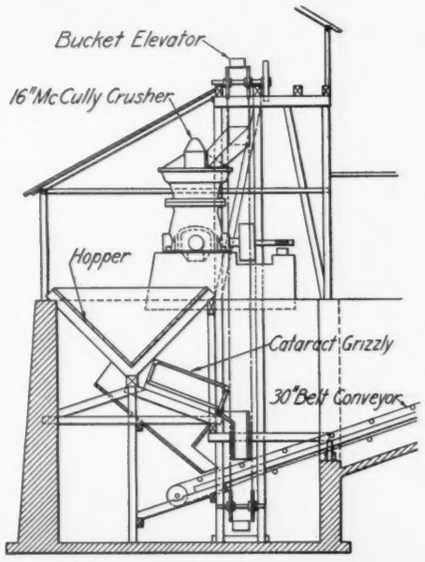
Daily Cost and Production Record

A simple but effective cost system is in use. As a load or carload of material goes out; the tonnage and kind, that is whether sand or gravel, is noted on a board. At the end of each day tonnages are totalled and carried over to the week column, and at the end of the week to the month column. The company knows what the labor cost is per ton of material produced daily, and also what the bank is running, that is, what is the percentage of sand or gravel from day to day. These daily figures do not mean so much, but when they are totalled for a period of a month or even a week, it is possible to get a good idea of what the bank is running and whether or not the labor is producing as it should. It is also possible to regulate the plant so as to produce that type of material which seems to be in greatest demand.

A Blaw-Knox steel batch box of 116-ton capacity set on concrete foundation is placed alongside the plant for batch service. It is filled direct from the bins or from the stock pile by the locomotive crane; for loading from stock pile and switching cars, etc., an 80-ton Orton and Steinbrenner locomotive crane, equipped with a 55-yd. boom and a 2½-yd. Williams clamshell bucket is used.



Novel arrangement of primary crusher and cataract grizzly



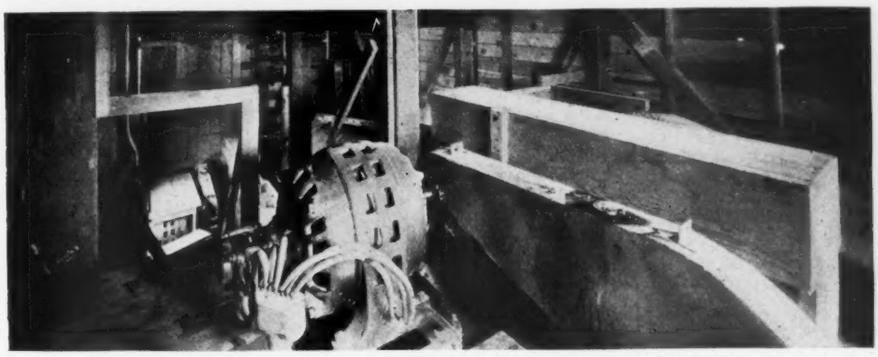
Detail of primary crusher unit—a special feature of this cataract grizzly was described in the Hints and Helps for Superintendents pages of the issue of April 18

Personnel

This plant is of particular interest because it is serving as a model of several sand and gravel plants being built by the J. L. Shiely Co. for the Great Northern Ry. These will be principally ballast plants, but will be operated by the J. L. Shiely Co., the same as any commercial plant is operated. At the start, of course, not all of them will be equipped with sand separating devices described above.

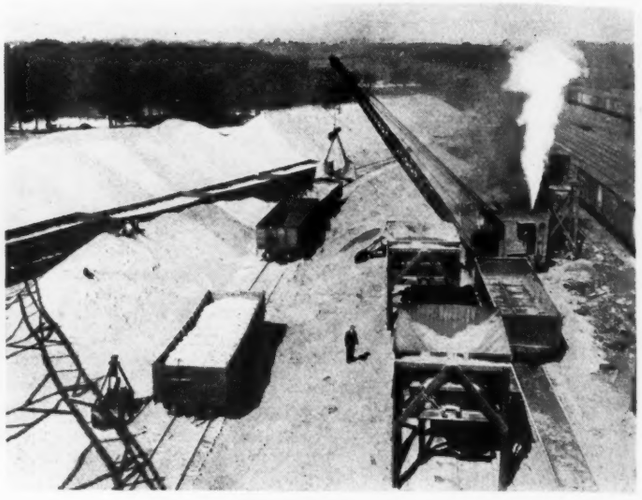
One of these new Great Northern ballast plants was illustrated in Rock Products of April 18 and they have been described, together with some of the special features of the contract between the J. L. Shiley Co. and the railway company in two previous issues. They are all to be located in the far Northwest.

Officers of the company are J. L. Shiely, president; A. R. Shiely, vice president; D. L. Bell, treasurer; H. J. Farrel, secretary. They maintain a downtown office in 210 Builders' Exchange Building, St. Paul. The company has been in business for 11 years and has built it to its present status by its policy of service. The policy of the company toward its employes was explained by J. L. Shiely in the Sand and Gravel convention in Chicago last January, and its success is attested by the fact that a number of the employes have been with the company for more than 10 years. O. A. Nelson, the plant



Silent chain drive at the head of the main belt conveyor

Loading gravel from pit to cars for plant



Loading gravel from storage for shipment

superintendent, has been 11 years with the company and was with J. L. Shiely's father four years before that.

J. L. Shiely is very well known throughout the entire sand and gravel industry in the United States. He is treasurer of the National Sand and Gravel Association, and held the same office last year. He has been active in the affairs of the association almost from the start.

Iowa's Diminishing Gravel Supply

IOWA'S diminishing supply of gravel for higway material (which was noted in a recent issue of ROCK PRODUCTS) is thus set forth by an article in the *Iowa Highway Commission's Bulletin.*

"Already, counties which have gone farthest in graveling their road systems using chiefly their local deposits found near the roadside are beginning to have trouble in finding enough material for necessary maintenance with frequently none at all for new construction. These local deposits are the only available sources for economic material in sight at present for the improvement of the lesser roads which comprise the greater part of the secondary system mileage. Experiments are in progress on short road sections in several places in Iowa in which there is being combined with the earth several different materials in an effort to find some combination that will give stability to the earth road surface sufficient to handle light traffic. Experiments are also being conducted with sections built from material secured by crushing the soft Iowa limestone. Whether or not any of these combinations will prove good enough to warrant the expense of construction and maintenance cannot be told for another year or two at least.

"From all the information at its command it is the belief of the Commission that the use of the local gravel deposits for building and maintaining the heavy traffic roads is simply using up the material which we will seriously need when the demand fully comes, as it will within a few years, for really extensive surfacing on the secondary roads."

General view of the new J. L. Shiely sand and gravel plant with the crusher house in the foreground

Northwest Experiments with Plaster Sands

A Study of Current Practice at Seattle, Washington, with a View to Improving Plaster

By George O. Gray
Three Forks Portland Cement Co., Seattle, Wash.

THE successful use of wall plasters depends, largely, upon the quality and quantity of sands, and, yet, there has been very little done by the plaster manufacturers in conducting investigations on this important subject.

Of late years, numerous articles have been written on quality plaster, improving the methods each year by careful investigations in the laboratory, resulting in a fairly standardized product; but the same methods of mixing are pursued today as in the early part of its manufacture by using the arbitrary proportions of 1:2, 1:2½, and 1:3 mixes, without attempting to give consideration as to the screen analysis of the sands. The results are walls below standard.

The purpose of plaster is to bind the particles of sand into a mass that produce a wall fulfilling all the conditions required as to sound-proofing, insulation against heat and cold, fireproofing, and abuse.

Plaster is judged by its sand carrying capacity, spreading properties, setting time, and hardness; a wall by its hardness, freedom from cracks and, occasionally, its sound-proofing qualities.

Sand carrying depends upon the quality and freshness of the plaster, and fat working plaster is loaded with sand until "it looks right and works right," without taking into consideration the fineness of the sand in proportion to the intermediates and coarse material and also the bulking, due to moisture. The use of the square point No. 2 shovel, as a standard of measure, results in oversanded walls and variations in setting time with the natural consequences to follow.

It therefore is apparent that the manufacturers must soon interest themselves in what constitutes a plastering sand, to see that the specifications by architects are drawn to protect important work and to insist upon certain screen sizes, properly proportioned, as well as the quality of the sand used.

In the Northwest States there is every sand condition that could possibly be met with, as well as a variety of climatic conditions. With the usual run of mechanics, good, bad and indifferent, plaster complaints naturally follow. In view of the above, the writer, who is connected with one of the cement mills, has been conducting, under the supervision of the Northwest Testing Laboratory, Seattle, a series of tests, not conclusive, but with the idea of attempting to help find the direct cause of complaints. The fault is, in the minds of the trade and builders, always with the brand of plaster; but we know different.

Plastering Sand Defined

The first question to be answered is: "What is a plastering sand?" The answer: Sand free from vegetable matter, sodium and magnesium salts, alkali, and other deleterious matter, with a minimum amount of clay, all of which directly affect the setting time of the plaster and the hardness of the walls, with the possible exception of the clay content, which does not affect the wall under 20%, but does affect the setting time in proportion to its per cent.

A minimum amount of fines passes through a No. 100 mesh, a minimum amount of coarse retained on a No. 8, with the intermediate sizes proportioned according to the kind of wall desired; that is, porosity for sound-proofing, as in residences, hospitals, and apartments; or density for hardness, as for auditoriums, outside walls, warehouses, garages and store rooms.

As a basis for experiments, a certain sand was used which will be known as "B" with the following screen analysis (Tyler), 0.2 on 8-mesh, 1.6 on 14-mesh, 16.0 on 28-mesh, 72.8 on 48-mesh, and 97.6 on 100-mesh, which gave a "fineness modulus" of 1.88. This will be expressed from now on according to its "granulometric composition" in three screen sizes, which method greatly assists in the analysis. All sand retained on a No. 50 standard screen (same mesh as Tyler 48), will be known as "C" for coarse; "M" for medium, which is retained on 100 passing 50; and "F" for fines passing through 100. This gives the "B" sand the following granulometric composition: "C"—72.8, "M"—24.8, "F"—2.4. This sand is a washed bank sand containing a high percentage of silicates, and is structurally sound, showing the same characteristics in color, structure and shape in each screen separation, with a "volumetric composition" of solids 51.285%, voids 48.715%, and weight per cubic foot dry (loose) 97 lb., 13 oz., packed 104.0 lb., 5 oz.

Washed sand is delivered direct from bunkers by truck to the job. It contains various percentages of moisture, which decrease the weight of the sand per cubic foot, resulting in a reduced proportioning of materials, if a measuring box is used, and oversanding if shovelfuls are used without taking into consideration the bulking effects.

Chart No. 1 illustrates graphically the moisture effects on "B" sand. It gives the maximum bulking at 3% moisture of 37.978% over the packed sand, with a loss of 28.7115 lb. of sand in weight over packed, and a loss of 22.2115 lb. over the loose. Therefore a measuring box would have to contain 2384 cu. in. of space to hold, by weight, one cubic foot of dry sand, weighing packed 104 lb., 5 oz. To further illustrate, on a 1:3 mix of sand containing 3% moisture it would require almost four cubic foot measures of sand to a 100-lb. bag of plaster, otherwise the mix would be 1:2¼.

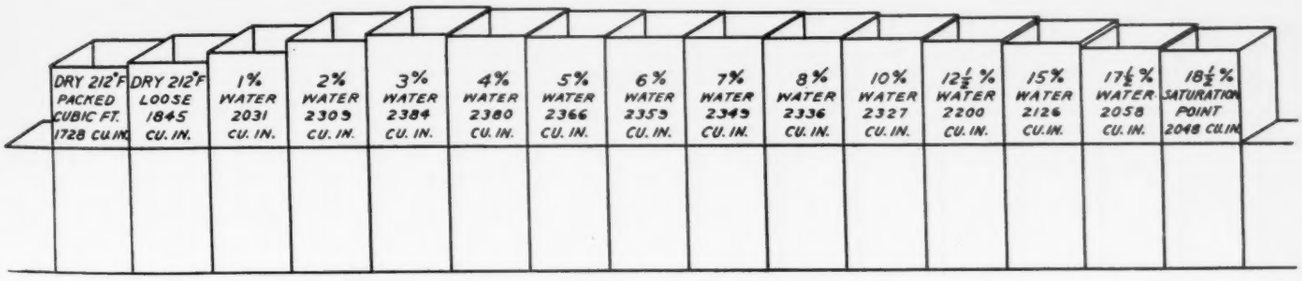


Chart No. 1. Moisture effects on "B" sand used for mixing plaster

Several moisture tests were made on various sands, and it was found that the average sand delivered direct from the bunkers contained from 5% to 6% of water which the sand will continue to hold, if the humidity is high, decreasing according to the dryness of the air, length of time and exposure considered. So that for correct proportioning, it would be necessary to ascertain the moisture content at least three times per day, under humidities below 70, by taking a fair average sample of the pile, weighing out five pounds, drying on a stove, until no vapor passes; then weighing the dried sand, dividing the difference in ounces by 80, which will give the per cent of moisture contained.

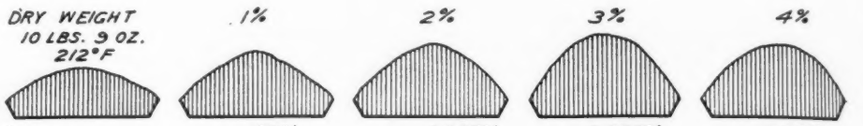
The maximum amount of water possible to hold in suspension, by wetting "B" sand is about 18½%. It was found for the sake of experiment, that by pouring the sand into pans full of water, decanting off the surplus, then placing in the cubic foot measure, it was possible to hold in suspension 20% of water, with a decrease in bulk of 6.84% under a cubic foot. This was due to the saturation of the sand (inundation), thereby creating a condition of compactness similar to our beaches. This would not arise under general conditions; but if the sand is subject to a driving, hard, soaking rain, it is possible that the sand will contain as much as 19% to 20% of water.

It is the writer's experience that plasterers use a Number 2 shovel, as their standard of measure for sand, which is shoveled direct into the mortar box or into a wheel barrow, counting the number of shovels to each bag of plaster. One of their reasons for using this method is to save labor expense. This method should not be considered an objection, provided due consideration is given to average shovel and an allowance made for moisture content.

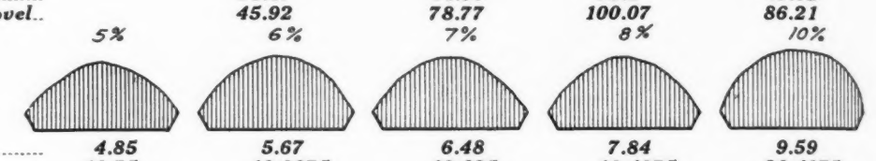
In order to develop the effect of moisture on a shovelful of sand, by tests, a standard No. 2 shovel was used, which measures from heel to toe 11¾ in., width of toe 9¾ in., width of flare 7½ in., from toe 7⅞ in., width of heel 7⅞ in., depth 1 in. from toe 11/16-in., depth 7½ in. from toe 1½ in., weight 5½ lb., length overall 5 ft. The sand was pyramided each time, after the moisture was added, placing the shovel under the pile which contained 1 cu. ft.; lifting vertically permitting all surplus sand to drop off, seeing that no sand protruded over the blade; averaging the slope as fair as possible, according to the nature of each mass; then weighing the contents. The result is graphically shown on chart No. 2.

The total weight of one No. 2 shovelful of "B" sand dried to 212 deg. F. is 10 lb., 9 oz. The bulking effect of 3% moisture is 50.2%, with an increase of 100.07% by weight of sand, or 21.132 lb. sand (dry). With each additional per cent of water added, there is a variable decrease and increase, until 17½% is reached. This shows a slight increase over 3%, with the maximum bulking at 18½%, which contained 22.283 lb. dry sand. Naturally, the human factor is to be considered in all the findings, but for all practical purposes a fairly safe average can be obtained by proportioning.

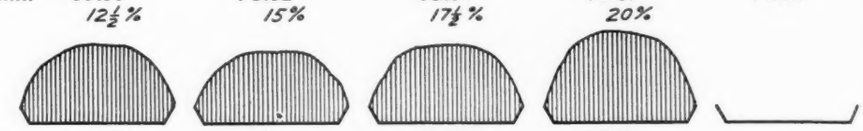
Chart No. 4 on shovel equivalents, for various mixes, when per cent of moisture is known, can be used to an advantage if a No. 2 standard shovel is used as a measure. It is an improvement over the present-day guess work, causing over-sanded, soft walls; under-sanded high cost walls, contraction cracks, etc., as well as affecting the setting time of the plaster which is designed for a certain mix, thus causing dry outs, checks, etc., when that particular mix is not used.



Corrected moisture pct. (due to evaporation)		.97%	1.945%	2.925%	3.91%
Weight wet sand per shovel, pounds		15.5625	19.25	21.75	20.4375
Weight dry sand per shovel (computed)		15.413	18.883	21.132	19.668
Weight water per shovel (computed), pounds		.1495	.367	.618	.7695
Pct. bulking wet over dry sand		31.47	44.06	50.2	45.62
Pct. weight increase wet over dry per shovel		45.92	78.77	100.07	86.21



Corrected moisture, pct.	4.85	5.67	6.48	7.84	9.59
Weight wet sand, per shovel, pounds	18.75	19.9375	18.625	18.4375	20.4375
Weight dry sand, per shovel, pounds	17.882	18.867	17.492	17.097	18.64
Weight water, per shovel, pounds	.868	1.0705	1.133	1.3405	1.7975
Per cent, bulking	40.93	44.02	39.62	38.22	43.33
Per cent, weight increase	69.30	78.62	65.60	61.87	76.47



Corrected moisture, per cent	12.5	15.	17 1/2	18 1/2
Weight wet sand, per shovel, pounds	23.5	21.4375	25.125	26.40625
Weight dry sand, per shovel, pounds	20.9	18.641	21.383	22.283
Weight water, per shovel, pounds	2.6	2.7965	3.742	4.12325
Per cent, bulking	49.46	43.34	50.6	52.6
Per cent, weight increase	97.87	76.48	102.44	110.96

Chart No. 2. Effect of moisture on pyramiding of sand in shovel

CHART No. 4—SHOVEL EQUIVALENTS

	—Mix by Weight— 1:2	1:2½	1:3
Sand—Dried 212° F., number shovels	18.93	23.67	28.4
Sand containing 1% water, number shovels	12.98	16.22	19.46
Sand containing 2% water, number shovels	10.59	13.24	15.88
Sand containing 3% water, number shovels	9.46	11.83	14.19
Sand containing 4% water, number shovels	10.17	12.71	15.25
Sand containing 5% water, number shovels	11.18	13.98	16.22
Sand containing 6% water, number shovels	10.60	13.25	15.90
Sand containing 7% water, number shovels	11.43	14.29	17.15
Sand containing 8% water, number shovels	11.69	14.62	17.54
Sand containing 10% water, number shovels	10.73	13.41	16.09
Sand containing 12½% water, number shovels	9.57	11.96	14.35
Sand containing 15% water, number shovels	10.73	13.41	16.09
Sand containing 17½% water, number shovels	9.35	11.69	14.03
Sand containing 18½% water, number shovels	8.97	11.22	13.46

18½% is about saturation point.
Chart based on Chart 2.
For finer sands reduce number shovels proportionally.
For coarser sands increase number shovels proportionally.
Averages should be considered.

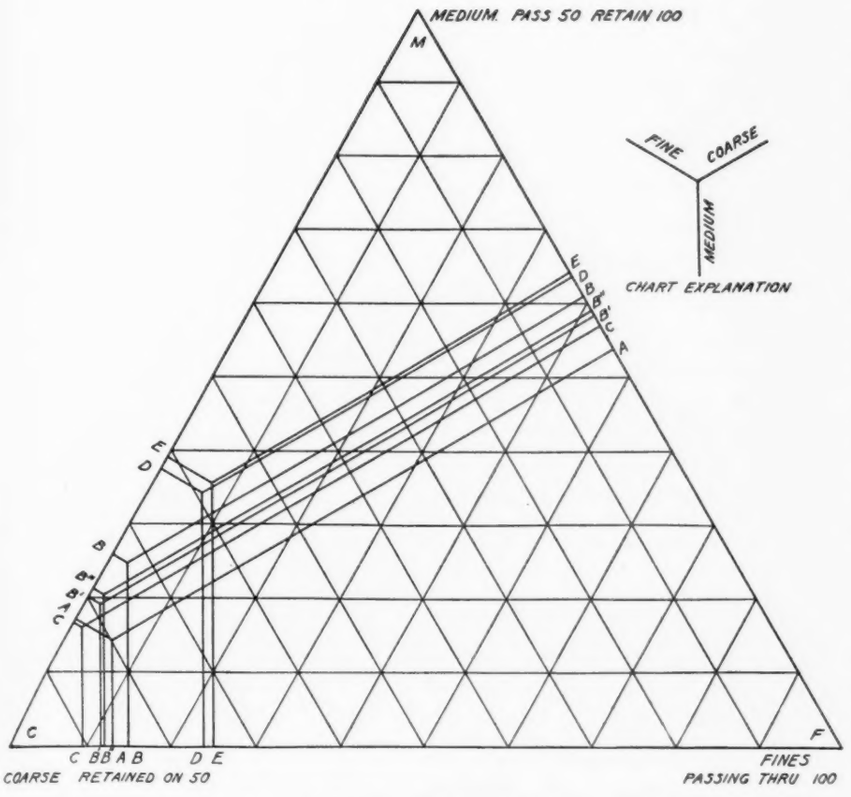


Chart No. 3. Plastering sands compared by relative proportions of Coarse (C), Medium (M), and Fine (F)

SCREEN ANALYSIS (TYLER)

	4		8		14		28		48		100	
Name	Ret.	Pass	Ret.	Pass	Ret.	Pass	Ret.	Pass	Ret.	Pass	Ret.	Pass
A	0	100	10.	90.0	....	.....	.....	.....	80.	20.0	94.0	6.0
B	0	100	0.2	99.8	1.6	98.4	16.0	84.0	72.8	27.2	97.6	2.4
B′	0	100	0.4	99.6	....	.....	21.2	78.8	78.8	21.2	98.2	1.8
B″	0	100	0.2	99.8	....	.....	21.2	78.8	78.0	22.0	98.2	1.8
C	0	100	0.2	99.8	....	.....	29.2	70.8	82.4	17.6	98.6	1.4
D	0	100	0.3	99.7	3.2	96.8	14.2	85.8	59.0	41.0	93.4	6.6
E	0	100	0.3	99.7	1.8	98.2	10.2	89.8	57.0	43.0	92.8	7.2

GRANULOMETRIC COMPOSITION

Name	Coarse	Medium	Fine
A	80.0	14.0	6.0
B	72.8	24.8	2.4
B′	78.8	19.4	1.8
B″	78.0	20.2	1.8
C	82.4	16.2	1.4
D	59.0	34.4	6.6
E	57.0	35.8	7.2

Based on Standard Sieves.

The American Society of Testing Materials has issued as a Tentative Standard C-35, 21-T, for plastering sands, a screen analysis, as follows: not to exceed 10% on a No. 8, 80% to be retained on a No. 50, and not to exceed 6% passing a No. 100, which has not been adopted as a standard as far as the writer knows.

Their recommendation can be assumed to be about correct, for the average wall where porosity is desired for sound-profing, as well as hardness, but must be considered as an ideal requirement rather than a practical one, on account of variations of bank run and river deposits. It would not be practicable to specify definite sizing, although specifications could be drawn with certain limits, so as to protect all interests concerned, or until such time as enough interest is shown by years of research work, to design a wall, somewhat as cement concrete mixtures are being designed today.

In order to study the sands of the city of Seattle, in detail, they are divided into coarse, medium, and fine, based on their "granulometric composition"; that is, all sand retained on a 50, passing a 4, is classified as coarse (C); that which passes 50 and is retained on 100 as medium (M); that passing the 100 as fine (F). Expressing the A. S. T. M. recommended sizes on a "granulometric composition" basis we have C-80, M-14, F-6, which is called "A" sand on Chart No. 3 accompanying this article, illustrating a few of the sands on this market used by the plastering trade, and showing a comparison of the coarse to the medium, and to the fine, by proportion and relationship of sizes.

How to Read Triangular Chart

In reading the triangle chart the line opposite the angle "C" gives the exact proportion of the coarse sizes to the intermediates, as expressed by the line opposite "M" angle; likewise the fines opposite angle "F". By scaling, the exact percentage can be obtained of the three sizes, also the relation of one sand to another. Sand "A", which is an assumed A. S. T. M. standard, scales "C"-80, "M"-14, and "F"-6, therefore accepting "A" as correct, sands "D" and "E" are short on coarse, long on medium and fines, which will have a higher bulking per cent than "B", "B′", "B″", and "C". Consequently, if a shovel measure is used, considerably more sand will be contained upon each shovel, resulting in a leaner mix, unless the number of shovels are proportionally decreased; conversely, the opposite effect will be produced if a box should be used as a measure. At a glance sands "B", "B′", "B″", and "C" shows a minimum amount of fines, with a slight increase of intermediates, except "B", and ideal on coarse. These sands under proper mix will insure good results.

From further study of the chart, it is obvious that the setting time of the plaster, as well as the density of the wall, will show considerable variance, so that all sands should be standardized. As a matter of interest sands "B", "B′", and "B″" are sands from the same bunkers. "B′" sand is washed the second time, with no change in the fines, but a slight increase on the medium and corresponding decrease on the coarse, while sand "B" was secured a few days later, for the tests given on charts Nos. 1, 2, and 4.

Plasterers are inclined to prefer sand that shows an excess of fines and intermediates for the reason that it gives the "slip" to the trowel, thereby giving more yardage per man. They will unconsciously use more sand due "to looks of mortar," or overlook the fact that the bulking effect of sands increases in proportion to the increase in production of fines and intermediates to the coarse; and that the finer the sands, the more surface area; which calls for an increase of plaster in proportion, rather than a decrease. This is the direct cause of most plaster failures, and this fact should be given serious consideration by architects, contractors, plasterers, and above all by the united action on the part of all hardwall manufacturers in correcting this evil.

This can only be accomplished by publishing full reports of research work, in order to educate the general public, as well as architects and mechanics. Again manufacturers must see that the specifications are drawn to permit a sample of the plaster to be removed from the box or wall each day, so that the material can be separated, showing the proportions and the kind of sand used. This would act as a protection to the plasterer as well as the builder. The legitimate contractor is forced to use cheap sands that will give him the greatest yardage in order to compete with the one who "skins" the job, otherwise he is without contracts. But with proper specifications and inspection, they will be glad of the opportunity to improve their walls. In this day of enlightenment the plastering trade has been neglected, and it is hoped that the subject matter contained in this article will bring forth the comments that it should.

Cooperative Compensation Insurance

A Study of the Kinds of Insurance as Applied to Employers' Liability in Quarrying Operations

By R. N. Van Winkle
General Manager, Hawkeye Quarries, Cedar Rapids, Iowa

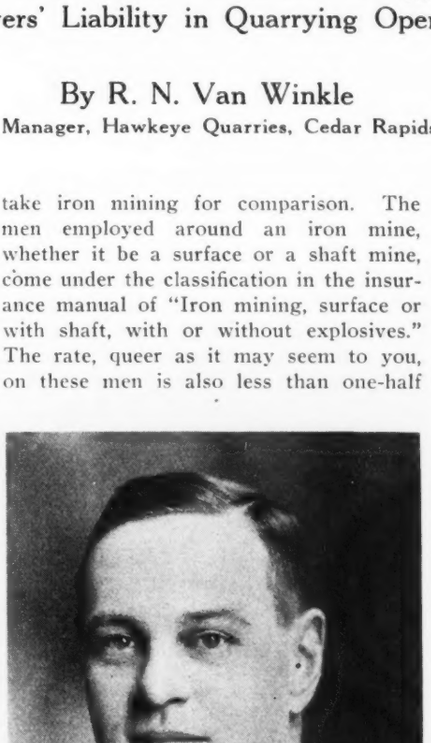
SINCE the writer commenced this series of articles dealing with workman's compensation and safety methods as applied particularly to the quarrying industry the seemingly inevitable has happened. The manual rates on workmen's compensation applicable to the quarry business, and for all branches of this industry, were increased the first day of July last year. This increase was not a minor increase of 5 or 10%, but a substantial increase of approximately 23%. If, by chance these glad tidings have not already been brought to your notice, don't worry, they will be when your present workmen's compensation insurance policy expires and renewal is made.

Insurance companies in their defense of this increase in rates claim that the loss ratio figures on workmen's compensation insurance show a deplorable condition which warrants the increase, stating further that they cannot be expected to do business at a loss. The writer sometimes wonders that, if, insurance companies really lose money on workmen's compensation in the quarry business, as they claim, how in the world they come out when they can carry compensation on men employed in seemingly more hazardous occupations at less than one-half the rate charged for quarrying.

Why Are Quarry Rates Higher Than Equally Hazardous Industries?

Let us take the compensation rate charged on a man who is a switchman on a steam railroad, who by reason of his occupation comes under the classification "steam railroad operation and maintenance." The manual rate on this man is less than one-half of the rate charged for a man employed as a pitman around a steam shovel in one of our quarries whose duties put him under the classification "Quarries, crushed stone including operation of crushers, including blasting." Which in your judgment is the more hazardous occupation, a railroad switchman who climbs box cars in raining and sleeting weather and jumps off and on moving cars day and night, or a pitman around a steam shovel in a modern quarry?

Perhaps to cite a case where the operations and hazards are more similar to those of the quarry industry, we should take iron mining for comparison. The men employed around an iron mine, whether it be a surface or a shaft mine, come under the classification in the insurance manual of "Iron mining, surface or with shaft, with or without explosives." The rate, queer as it may seem to you, on these men is also less than one-half



R. N. Van Winkle

the rate charged for men working in a quarry as classified above.

To go to the extreme let us take the structural iron workers, the men who erect structural steel in our modern skyscrapers. I'll wager most every one of us has stopped at some time or other, awe-stricken, to watch far above the sidewalk or street, some structural steel worker hanging onto a beam or walking a girder with nothing between him and sudden death but very thin air, a job the writer would not want unless he was equipped with "sky hooks" of an approved pattern and then I have my doubts. Modern quarrying even with its explosives hazards is to my mind mere child's play when compared to this ultra-hazardous occupation. Still, insurance companies quote a manual rate covering structural steel workers of less than double the rate for quarrying as classified above.

What's Wrong With Quarry Insurance?

The question might be asked then, what is wrong with compensation insurance as applying to the quarrying industry? My answer would be, the trouble lies first with the insurance company, second with the quarry owner and third with the employes. The American phrase, "Business is Business," which is the cold, hard, grim conception of American business, is being literally applied by all three interested and affected parties of this triangle. Still if we could bring about more co-operation and inject a little humanity or human element into the question and into the interested parties, our wrongs, our misunderstandings and our grievances towards each other would unquestionably be diminished, if not entirely eliminated, to the financial betterment of all.

As for the insurance company, the insurer, it should be and I believe it is in the majority of cases, the intent and desire to serve their policy holders as thoroughly and cheaply as possible, and if the quarry owner or operator is being discriminated against by being called upon to pay unwarrantedly high rates on compensation insurance, the writer for one has faith enough in the insurance companies as a whole to believe the matter when brought squarely to their attention will be investigated by the proper board or committee with the idea in mind of reducing rates if at all possible. I do not mean a mock investigation, such as seems to be popular now days, but a real human investigation to right a wrong, if one is found.

The writer does feel that in some instances, insurance companies and their agents are dilatory in showing the quarryman that by separating or subdividing his pay roll he is entitled to different classifications on his employes, which surely will mean a reduction in rate and a saving in premium dollars to him. It would be well for insurance companies to remember when handling compensation insurance to use a little psychology in place of some of the cold business rules they now apply, as the quarry owner and operator are

staunch believers in the adage "millions for defense, but not one cent for tribute," due to the fact, I guess, that we are proud to be a part of a democratic nation by virtue of which we are governed as far as and no further than we desire to be governed.

More Cooperation Between Quarry Owners and Insurance Companies

As for the quarry owner, the insured, by his sincere co-operation with the insurance company and by acting in the capacity of a sort of a self appointed judge to see that justice is done the insurance company as well as his employes, wrongs can be righted and money saved and compensation placed where deserved and needed. Every quarry owner should discourage the tendency on the part of employes to develop into what might be termed fakers or impostors, as they deserve no other name, and to stretch out a period of disability and compensation, and see to it that adequate periods only for recuperation are claimed by employes, and not permit of delays that are an imposition and hardship upon both themselves, as an employer, and the insurance company. Regardless of what you may think you are the loser in the wind-up by such practices by being called upon to pay higher rates for compensation insurance.

Saving by Sub-Classifications

Many premium dollars can be saved to the insured if he will insist on sub-classification of his employes by the insurance company and take adequate steps to so separate his pay roll for auditing. It is not fair in most instances that the quarryman should pay the high premium called for under the manual rate of the classification "Quarries, crushed stone, including operation of crushers, including blasting" for his whole force of workmen when there are other classifications much cheaper which are applicable and will fully cover men around his operations. For instance the classification "Stone crushing, no quarrying," which manual rate is about one-half of the general classification and a classification into which practically all men can be put except those directly engaged in quarrying operations. There are still other classifications into which employes around a quarry can be put, such as the classification "Mill wright work, drivers and helpers, etc.," which rates in every instance are less than the general classification.

To be more explicit we will take a case of the writer's own company where we actually saved 14% of our insurance premium on workmen's compensation by such classifying of our employes instead of paying the general classification rate. I am rather inclined to believe the small quarry owners and operators are not taking advantage of this point and rather regret the insurance companies do not show them the way to save on their premiums in this way. It would be a feather in the insurance companies' caps and be the medium of creating a better feeling and a spirit of co-operation between the employer and the insurance companies.

Education of Employes

The last, but by far the most important, factor in this triangle is the employe. The one thing that stands out as paramount when considering the employe, the worker who gets hurt, is the belief in his mind that when he gets hurt his opportunity has come to deal with a huge corporation rolling in wealth and for him to deceive or beat them in collecting compensation. This is neither fair nor commendable. He looks upon an insurance company as do too many people look upon our railroads when filing or collecting claims, a fair prey for everyone. This misconception on the part of employes is the first thing that must be corrected and he must be brought to realize that it is not the insurance company but you who is the one who pays for thoughtlessness and carelessness that control accidents, by being penalized with increased premiums when the loss ratio on your workmen's compensation policy advances above certain limits.

It is hardly possible, the writer feels from his own experience, to lay too much stress on this point and get it over to your men that insurance companies are not charitable institutions operated by philanthropists, but that every dollar and more they receive as compensation comes directly out of your pocket, their employer and that you, not the insurance company, pays the frightful price of carelessness.

While the writer lays no claims whatsoever to knowing anything much regarding the workmen's compensation insurance, he does know from experience that employes often are utterly unfair with the insurance companies. As it is extremely difficult to determine sometimes the full extent of injuries and should the employe make up his mind to be dishonest, he can in a great many instances receive for less serious injuries compensation fully as adequate as employes or workers who are unfortunate enough to lose an arm or leg or sustain some other major injury. If this practice is continued by unscrupulous employes and workers the insurance companies should, to combate such practices take steps to make a lump sum payment for proven injuries of certain kinds, and I believe some such arrangements are now in their minds.

The employe, the worker, will get hurt despite all preventive measures, but due to the fact that he is constantly in direct touch and in most instances present at the scene of the accident he can, if he is properly imbued with the idea of co-operation, dig deeper into the underlying causes of accidents and make valuable suggestions for vigorous methods of prevention and by so doing become to the insurance company, as well as his employer, an asset instead of a liability in accident prevention.

Conclusions—Other Dividends from Safety Work

In this series of articles dealing with workmen's compensation and safety methods it was not the intent or desire on the part of the writer to write a technical treatise or discussion on the subject, as smarter men and men more schooled along this particular line of activity have written pages, even volumes on the subject and have forgotten more doubtless than the writer will ever know regarding it, but the object in mind when writing and gathering the facts was to present to my fellow quarrymen, if possible, a question of importance to all of us and one which if we have not already discussed has at least been active in our minds.

In conclusion it will not be amiss, I think, in a general way to give you some idea of what "Safety" as we have come to know it means and will accomplish for us.

Safety work and the prevention of accidents, where it has been undertaken, as a whole has been captioned, "Good Business," but little of value can be accomplished if the parties affected stand separate and apart from one another. The word "Safety" is but the skin of a living idea. Safety is after all a moral builder. Safety has no negative values. Co-operation and participation in it by anyone and everyone will bring a wealth of satisfaction and a definite economic gain to each and every participant with no losses on any side. In our own particular case by co-operation and participation, the owner of the business, the quarryman, makes money on successful safety work. The insurance company profits and the men, the workers, are saved days of suffering and their lives are saved.

San Francisco School-House Specifications Opened to Gypsum

MANUFACTURERS of gypsum plaster will hereafter be permitted to bid on contracts for school buildings being erected by the board of education throughout the city, following a decision reached recently at a special conference with plaster concerns. Protest was recently made by plaster firms that specifications, prepared for school buildings by City Architect John Reid, Jr., prevented them from bidding for the jobs. The specifications called for lime plaster gaged with Keene's cement. The acoustic properties of the gypsum plaster were questioned by members of the board of education, but it was argued there is little difference between the materials.—*San Francisco Chronicle.*

Rock Dust Industry, Berks County, Penn.

Interesting Example of a Change in Products to Meet Unalterable Operating Difficulties—From Slate Granules to Slate Dust

By R. W. Stone
Assistant State Geologist, Harrisburg, Penn.

BEFORE the World War, red and green slate was quarried on Maiden Creek in northern Berks County, Pennsylvania, and crushed to granules for use in surfacing asphalt shingles. The production of roofing granules has been discontinued in this locality because it was difficult to prepare the material free from dust. The three quarries and two plants working on these slates are now making rock dust.

In the Martinsburg shale of Ordovician age, which is the common country rock in northern Berks County, certain bands have been altered by severe folding and squeezing to a true slate. The rock breaks into thin plates but does not cleave into slabs suitable for roofing slate. Some bands are bright green and some are bright red; others are mottled green and red. Some of the rock contains small stringers of quartz, and some has bright yellow spots probably made by bleaching around small grains of iron pyrite.

The operators in this district are the Greenwich Manufacturing Co., Lenhartsville, the Atlas Mineral Products Co., 710 Hamilton Street, Allentown, and Job Wilbur Co., 12 Dudley St., Providence, R. I.

Slate Flour—325 Mesh

The quarry and plant of the Greenwich Manufacturing Co. are at Lenhartsville, 17 miles north of Reading on the east bank of Maiden Creek, and on the Schuylkill and Lehigh Branch of the Philadelphia and Reading R. R. The officers of the company are Horace Boyd, president, Edward H. Tait, vice president and general manager, and Morris Black, secretary. The business was started about 1919. Two parallel quarries have been driven in red slate 75 to 100 ft. long and 35 to 40 ft. deep. The beds are tilted at an angle of 60 deg. and one quarry face shows close folding, especially brought out by the thin bed of limestone that makes a hairpin loop. The rock is mostly picked down by hand and moved in small cars to the mill. The rock goes through a Gates gyratory crusher, is elevated by a bucket belt to a rotary dryer 50 ft. long and 5 ft. in diameter. After drying it is passed through a ball mill and a tube mill and then goes to the storage bin. A Gayco centrifugal air separator forms part of the equipment of the mill. All machinery is driven by electricity. The product is bagged by a filling machine and sold under the name "Linotalc." The product, a slate flour, 96% passing 325-mesh screen, is sold to manufacturers of linoleum, rubber and phonograph records for filler.

This plant originally made roofing granules but discontinued that product because of difficulty in freeing the granules from dust. At present the green slate that has to be quarried with the red is being dumped on a waste pile or used on the near-by roads. Seven men are employed in the quarry and eight in milling and shipping the product. The plant was in operation throughout the year 1924.

At Greenwald, a station three miles by railroad north of Lenhartsville, Herbert J. Focht (Kempton P. O.) is quarrying slate for Job Wilbur Co. The quarry, which is on the hill about 100 ft. above Maiden Creek, is about 100 ft. long and 75 ft. deep. It is reached by a narrow deep cut. The beds dip southeast about 60 deg. Most of the quarrying is by hand labor, as is also the loading of quarry cars. These are pushed to the head of a double track gravity tram, lowered to the railroad and dumped directly into railroad cars on a siding. The red and green slate are shipped together to Philadelphia for grinding to rock flour. Vein quartz and other unsuitable rock is dumped on a waste pile. The quantity of quartz is too small to be of interest as a source of silica. The quarry was operated more than half of the year 1924, three men being employed.

Shovel-Operated Slate Quarry

Near Albany, a railroad station about 4 miles from Lenhartsville, the Atlas Mineral Products Co. has a quarry and mill on the the west bank of Maiden Creek. Contorted beds of red and green slate standing at an angle of 70 deg. are exposed in the creek bank. The original operation was the quarrying of red slate and making of slate granules, but since 1919 the industry has been confined to grinding green slate to rock flour.

The quarry face is about 150 ft. long and up to 60 ft. high. Some beds show close folding. The rock is dug by a Thew ¾-yd. steam shovel. Only the olive-green slate is taken, the red slate being avoided. The shovel loads the rock in small steel cars which are hauled by cable up a gentle incline to the mill. Cars are dumped into a Champion No. 4 jaw crusher. From the crusher the rock goes to hammer mills, and screens, and is finished in a tube mill. The dust from the tube mill is discharged into a bin, from which it is drawn by two sack fillers. The mill is driven by electric power. A Fuller mill to replace a hammer mill, screen, and the tube mill, had been received but was not yet in operation in November 1924. Fourteen men are employed in the quarry and plant.

The superintendent is Harry Reppert, Kempton P. O., under whose direction the mill has been built. Rock flour, the only product, is sold mostly for use as filled in gypsum wall paster and in asphalt products. Small quantities are reported to have been used as fire clay.

This rock products industry in northern Berks County illustrates how, by the application of brains and energy, a simple rock in the earth's crust may be converted into marketable products. The opportunity for developing many such industries in Pennsylvania awaits those who seek it.

Energy and Resource

(An editorial in "Natural Resources," published by the North Carolina Geological and Economic Survey)

FOR years on years in North Carolina the presence of sand and gravel indicated nothing except the worthlessness of the land on which it occurred. There was, as late as 1905, no production in any commercial sense. As lately as 1912, the value of the sand and gravel used in the state as a whole was reported as $38,487.

In 1923, there was produced in the state 2,052,947 tons of these once neglected materials, with a value of $1,437,539. Figures are not available for the year 1924, but it is certain that they will exceed these amounts and that a resource which is now in course of development by a score of important producers is to be the basis of a steady and continually expanding industry.

For while good roads gave the impulse to develop the deposits of sand and gravel, and sound economy has resulted in most of the hard-surface roads of the state being built of material furnished by the state itself, the roads are taking less than half of the product they encouraged. Sand and gravel and crushed stone competing with other states which had been producing them commercially for generations, are now seeking successfully markets far abroad. Because North Carolina built roads, North Carolina material is now building roads in other states.

Some day the pits of gravel and sand will be exhausted. Some day the road program will be finished. Some day the streams will be delivering their power to capacity. But the principle of energy working on resource in their case will be living in a hundred forms as a result of its application.

Derrick Transportation at Boston Trap Rock Company Plant

A Well-Drilled, Steam-Shovel Operated Quarry with an Unusual Temporary Transportation Scheme

EARLY in 1923 some Boston interests, headed by Ex-Governor Foss of Massachusetts, opened a quarry on what is known as "Sally's Rock" in Hyde Park. This "Rock" was in the past a favorite play and picnic ground for the children, but what was an excellent park had to give way to the demands of construction and road building. Hence the ambition of the Hyde Park Trap Rock Co., which was the predecessor of the present company. The company's property consists of 65 acres and is estimated to contain 20 millions tons of stone.

Less than a year ago the property was acquired by W. H. Connor of Middleboro, Mass. He and his son, John C. Connor, take care of the executive and operating problems. Mr. Connor has had considerable experience operating quarries in the trap rock section of the Connecticut valley.

The rock formation is peculiar and for a while placed many obstacles in the path of efficient operations. The stone is flinty in character and with a pinkish color. Its French coefficient is 20, higher than any other stone in the vicinity of Boston, and its toughness is rated at 14, about the average.

Blasting Restrictions

Under the present city blasting restrictions, the company is limited to 1000 lbs. of explosives to a shot. Because of this they cannot drill far from the face nor can they break the stone in a desirable way. The bad results are two-fold; the nature of the formation causes large blocks somewhat cubical in shape to loosen and constantly threaten to bury the shovel and the secondary blasting is much greater than it would be otherwise. The formation seems to be shot full of "slips" which have caused the loss of several holes when large blocks creep for several inches after the holes have been drilled.

Quarry operations are at present difficult, but when a face is formed the transportation methods will be changed from a derrick and skips to cars and an incline hoist.

The tonnage now produced is about 600 for an eight-hour day with a crew of 18 men, but an immediate increase of 200 tons is planned and the doubling of the capacity will come this year.

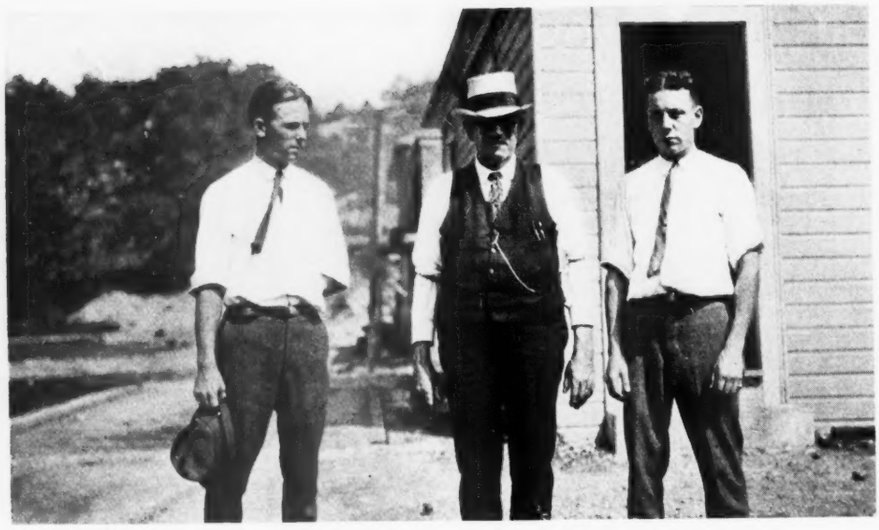
Well-Drilling 85-ft. Face

Well holes to a depth of about 85 ft. are placed 12 ft. from the face. An electrically operated Keystone driller takes care of this work. No bottom holes are driven although later on they may be. As pointed out, blasting restrictions limit them to 1000 lbs. of explosive to a shot, so naturally their drilling and blasting methods are somewhat inefficient. Powder used is Atlas 60% in the large holes and 40% for blockholing. Three men are kept busy doing this work with Ingersoll-Rand jackhammers and a Chicago Pneumatic Tool Co. blockholer. Air is furnished by a 480 ft. I-R compressor.

Well drill at Boston Trap Rock Co. quarry

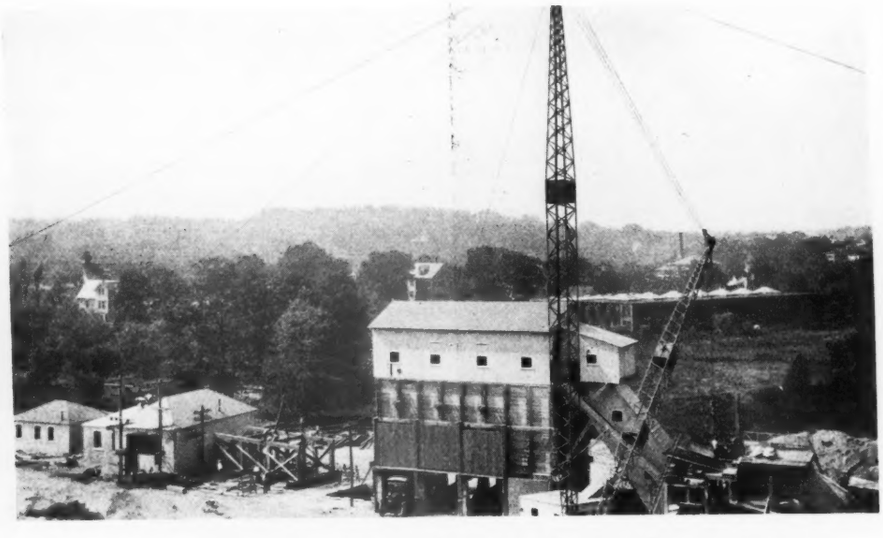
General view of quarry and plant of the Boston Trap Rock Co., Hyde Park, Mass.

An unusual combination—a steam shovel loading derrick skips



From left to right: John C. Connor, W. C. Connor, M. G. Howard

Derrick skip dumping into primary crusher



Another general view from top of quarry face

The stone is loaded into skips by a ¾-yd. Erie tractor shovel and the skips are then hoisted and swung to the crusher by an Insley derrick, which is operated by a 3-drum Mundy hoist driven by a 50-h.p. variable speed motor. This derrick is of steel with a 110-ft. mast and a 95-ft. boom. These operations are to be changed to an air hoist later on in hopes of speeding them up.

The flow of the stone through the plant is almost a straight-line affair, and will be entirely so when the present additions are finished. From the Farrel 36x48 in. jaw crusher the stone passes through a 5 ft. x 36 in. "bull" screen to one of two 14x28-in. secondary jaw crushers; this takes all over 3-in. stone. The undersize passes up a bucket elevator of 56 ft. centers to the main screen which is 32 ft. long and 72 in. in diameter. Four sizes of stone are produced: 2½-in., 1¼-in., 1½-in., and dust. The oversize from this screen is returned to one or the other of the secondary crushers by a short belt conveyor to the top of the elevator platform and then by chute. These crushers were installed by the New England Road Machinery Co. of Boston.

The plant is electrified throughout; the equipment consisting of nine motors ranging from 10 to 150 h.p. These were furnished by Westinghouse and Western Electric. Power used is 220-v., 3-phase, a.-c. current which is stepped down by three 100-k.w. General Electric transformers.

Storage at present is confined to four bins and the ground. Each bin holds 300 tons. Shipments are made entirely by truck—the company operating a fleet of seven 5-ton trucks. Loads are weighed at the office on Bennington 20-ton truck scales. For loading from ground storage a Haiss portable loader is used.

An interesting feature of the plant is the two-fold purpose of the wooden drop curtains at the bins (described and illustrated in Rock Products, October 4, 1924). One reason was to stop the theft of the stone—an unusual but actual event—and the other was to provide garage space at night for some of the trucks. These curtains are dropped and securely locked.

The market is quite widespread—shipments being made exclusively to points outside of Boston with a maximum haulage of 28 miles. Certain sizes, especially dust, are in such demand that the company, last fall, was buying outside to fill orders.

Plans for the Future

Work under way last fall called for a third secondary crusher and a three compartment bin. These additions are now being completed and are expected to increase the output by 200 tons and to provide better storage facilities to meet the changes in the sizes of stone called for.

Another important step to be taken in the near future is the erection of a 10,000-ton storage and loading station at Hyde Park which will not only provide extra storage

One of the fleet of 5-ton trucks used for deliveries

Handling ground storage with truck loader

capacity but also give opportunity for railroad shipments if desired.

The third step planned is to double the present capacity by building at the opposite end of the quarry a duplicate plant of about 800 tons. This plant is to be modern in every respect and to eliminate the bad points and keep the good features of the present plant.

Rock Products Production in Canada in 1924

By Gordon C. Keith, M. S.
Toronto, Ont.

THE total mill output of cement in Canada in 1924 was 7,766,108 bbl., an increase of 77,912 bbl. over the 1923 total. Shipments for the year amounted to 7,499,372 bbl., valued at $13,445,156, a decrease in quantity of 44,217 bbl. and in value of $1,619,505.

By provinces the average selling price, f.o.b. plant, was as follows: Quebec, $1.74; Ontario, $1.59; Manitoba, $2.60; Alberta, $2.37, and British Columbia, $2.63.

Consumption of cement in Canada during the year 1924 was 17% less than recorded for 1913. In comparison with 1923 the apparent consumption of the commodity increased 4%.

Customs' records for 1924 showed a decrease in the exports of cement of 340,231 bbl., while imports increased 10,000 bbl. A falling off in price was noted in the imports.

SUMMARY OF THE CEMENT PRODUCTION SITUATION IN CANADA

	1923		1924	
	Barrels	Value	Barrels	Value
Output	7,688,196	.....	7,766,108	.....
Sold or used	7,543,589	$15,064,661	7,499,372	$13,445,156
Stocks, December 31, 1924	1,251,546	.....	1,518,282	.....
Imports—				
Portland	17,697	75,394	27,672	69,320
Manufacturers'	.....	86,974	.....	9,772
Exports	493,751	824,811	153,520	213,845
Consumption	7,067,535	.....	373,524	.....

The average price per barrel in 1924 was $2.50 as against $4.25 in 1923.

Sales of lime declined 8% in quantity in 1924. The year's production amounted to 9,213,456 bu., consisting of 7,869,999 bu. of quicklime and 1,343,457 bu. of hydrated lime with a total value of $3,062,450. The average price obtained for quicklime was 32 cents per bushel, while hydrated lime sold at $11.89 per ton. Importation of lime totaled 4418 tons at $46,578, while exports were recorded at 22,750 tons, worth $411,122.

The amount of sand and gravel produced in Canada in 1924 was 11,793,098 tons, valued at $2,535,613, compared with 12,752,512 tons in 1923, valued at $3,016,518. There were 150,868 tons of sand and gravel imported into Canada in 1924, valued at $118,397; silica sand for the manufacture of glass and carborundum and for use in foundries amounted to 131,778 tons, valued at $324,379.

Stone produced in Canada in 1924 totaled 4,198,318 tons with a valuation of $5,641,928 as compared with 4,111,334 tons at $5,903,298 in 1923. In comparison with the sales for 1923 the quantity showed an increased of 86,984 tons, while the value declined $261,361. Importations of stone into Canada were valued at $910,157 and the exports at $170,113.

There was an appreciable increase in the shipments of Canadian gypsum in 1924 as compared with 1923. Sales for the year 1924 totaled 645,020 tons with a valuation of $2,198,598, while 578,301 tons at $2,243,100 were shipped in 1923. Imports of crude gypsum amounted to 3252 tons worth $63,156, while exports of Canadian gypsum totaled 477,462 tons, consisting of 472,236 tons crude and 5226 tons ground, with a total value of $831,756.

In 1924 there were 4355 tons of fluorspar imported, valued at $50,158.

Sales of Canadian feldspar in 1924 amounted to 39,776 tons, valued at $299,641, as compared with 29,255 tons at $237,601 in 1923. Exports amounted to 37,869 tons, an increase of 11,000 tons, while the imports increased 200 tons.

Government Specifications for Gypsum Plaster

MASTER specifications of the United States government for gypsum plaster are given in the circular of the Bureau of Standards, N. 205. Material and workmanship, chemical composition, physical properties, method of inspection and tests, packing and marking are specified in the circular. Copies of the publication may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents per copy.

Master Specification Circular for Quicklime

THE circular of the Bureau of Standards, No. 201 issued recently gives the United States government master specifications for quicklime for structural purposes. The requirements of quicklime as to chemical composition specified are: calcium and magnesium oxides, minimum, 95%; silicon, aluminum and iron oxides, maximum, 5%; carbon dioxide, maximum, at kiln 3%, elsewhere, 10%. The method of testing and inspection is outlined and detailed instructions for chemical analysis given. As to packing, quicklime may be delivered in bulk in carload lots, otherwise in 180 or 280 lb. barrels.

Copies of this circular can be procured for five cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Three Laborers Killed in Explosion at California Cement Plant

THREE laborers employed by the Cowell Portland Cement Co. were instantly killed near Concord, Calif., recently when a quantity of blasting powder exploded.

The tragedy is said to have resulted from the workmen's disregard of orders to use their hands in placing the powder in position. They used a shovel instead.

The dead are J. Lopez, I. Flores, J. Diangeon.—*Brooklyn Standard-Union.*

The Maryland-West Virginia Silica Sand Industry

General Observations on Methods and Equipment in One of the World's Most Important Silica Producing Districts

By Edmund Shaw
Editor, Rock Products

JUST where the state of Maryland is drawn down so thin that it looks from the map as though one might step across it from Pennsylvania to West Virginia is the town of Hancock, Md. On the other side of the Potomac river is Hancock, W. Va., and five miles farther south, up in the mountains, is Berkeley Springs, pretty well known for its baths and medicinal waters. The country around these towns comprises the Maryland-West Virginia silica sand district, which is not only one of the most important silica producing sections of the United States, but also one which produces silica sand of the highest purity.

Lower part of quarry face at the Berkeley Sand Co.'s quarry. The face is 300 ft. high and no view could be obtained showing full face

Quarry of the Pennsylvania Glass Sand Co. near Berkeley Springs—Note the tunnel through the waste rock to give access to the quarry

At the time of the writer's visit the shipments of the district were running between 65 and 70 cars a day. But this was during the last of August, when shipments were at the lowest, as many glass plants were shut down on account of the summer heat. In the height of the shipping season the car loadings will run to more than twice this amount. Much, if not the greater part of the output, goes into the manufacture of plate glass for which it is adapted on account of its low iron content. Some of the sand is sold with a guarantee that the iron content will not exceed 0.05%. About 0.02% of the iron found in the finished sand is "tramp" iron picked up by the process of crushing and drying. Experiments are being made at one plant to remove even this small quantity by magnetic separation.

The greater part of the quarries and plants are on the concrete-paved highway between Hancock and Berkeley Springs. Naming these in order, coming out from Berkeley Springs, the plants are: The Berkeley Sand Co., which is just at the edge of town, E. F. Millard; West Virginia and Pittsburgh Sand Co., Pittsburgh plant No. 2; Speer White Sand Co.; West Virginia and Pittsburgh Sand Co., West Virginia plant, and one plant of the Pennsylvania Glass Sand Co. The last named company has another plant at Roundtop on the railroad about 1½ miles west of Hancock, W. Va. About 5½ miles beyond Berkeley Springs, near the village of Great Cacapon, the Hazel Atlas Glass Co. has a plant which produces sand for use in its own glass works, and across the river, near Hancock, is the one plant on the Maryland side of the Potomac, that of the Maryland Glass Sand Co.

With the exception of a small operation on the site of one of the Pennsylvania Glass Sand Co.'s quarries, all these plants and quarries are comparatively new. The business began here about 15 years ago. During the war there was a great increase in production and the sand of this district was studied as a raw material for making optical glass, after the importation of optical instruments from Germany had ceased. A monograph on the suitability of Berkeley Springs sand for optical glass was written by R. W. Stone, at present assistant state geologist of Pennsylvania.

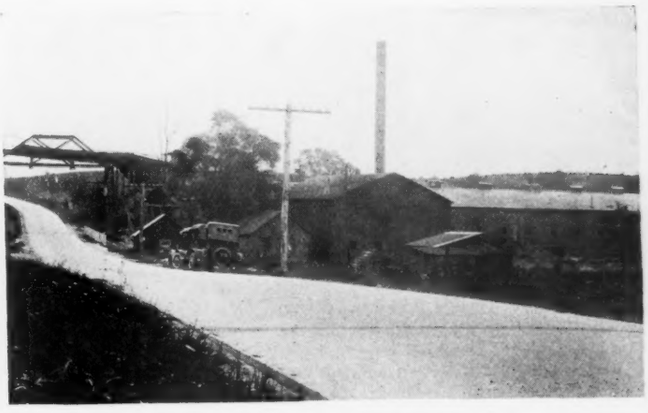
Geology of District

The geology of the district has thus been well studied. Beverly Randolph, whose home is near Hancock, and who has been a resident of the district for many years, has worked out an interesting theory to account for the exceptionally high silica content of the sand in this district. It is that water, highly charged with carbon dioxide (CO_2), has leached out iron, lime, etc., the CO_2 being derived from a small coal seam between the Oriskany sandstone and the Romney shale above. In an article in Rock Products of February 23, 1924, he elaborates this theory and gives some illustrations of beds that show evidence of such leaching. The shale and the coal seam show plainly, in one of the Pennsylvania company's quarries.

In addition to the glass sand washing plants there are two plants which grind the

Typical Silica-Treating Plants of the Maryland-West Virginia Silica Mining District of Which Hancock, Md., and Berkeley Springs, W. Va., Are the Centers

Plant of E. F. Millard, near Berkeley Springs



West Virginia plant of the West Virginia and Pittsburgh Sand Co.

Tube-milling plant of the National Silica Products Co., Berkeley Springs

Pittsburgh plant No. 1 of the West Virginia and Pittsburgh Sand Co.

Pulverizing plant of the Pennsylvania Glass Sand Co. at Roundtop

Washing plant of the Pennsylvania Glass Sand Co. at Berkeley Springs

Washing plant of the Pennsylvania Glass Sand Co. near Hancock

Drainage house and loading bins of the Hazel Atlas Glass Co., Great Cacapon

washed sand to be used in the making of pottery. One of these is the National Silica Products Co.'s plant at Berkeley Springs, the other is the grinding plant of the Pennsylvania Glass Sand Co., which is run in connection with its washing plant at Roundtop.

Quarrying Methods

The deposits are so much alike that both quarry practice and plant practice are much the same in one plant as they are in another. In all the quarries drilling is done by tripod

Washing plant of the Hazel Atlas Glass Co.

air drills. Holes are put down 18 to 20 ft. and sprung with dynamite. Afterward they are loaded with FFF black powder and then shot. The quarry faces are high, the Berkeley Sand Co.'s quarry is more than 300 ft. high, and often the work is carried on in benches. What is considered an economical way of attacking the rock is to shoot out the toes and to work on the vertical strata, putting in horizontal holes to lift the rock and vertical holes to throw it out and away from the face.

Loading is almost wholly by hand, as some sorting is necessary to pick out the lumps of hard ganister. This ganister comes from parts of the deposit where the sandstone has been resilicified turning it into quartzite. All the quarries have more or less of it except one of the Pennsylvania company's quarries in which the rock is friable and quite free from hard lumps.

The Berkeley Sand Co. crushes this ganister and sells it for making ferro-silicon and other uses to which a hard, pure silica in lump form is adapted. A good deal of ganister is also crushed into railroad ballast.

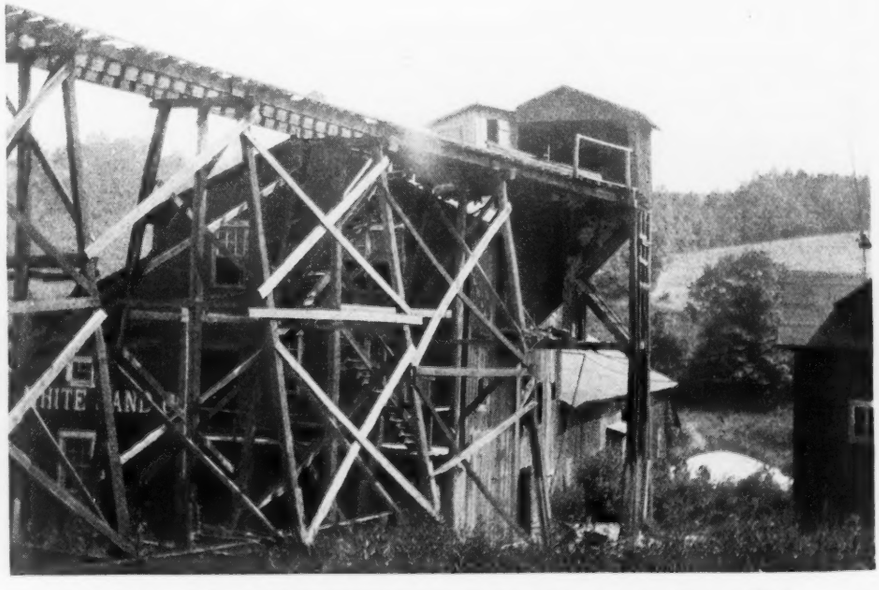
Quarry Transportation

Transportation from the quarry to the plant is by many different methods. In the plants near Berkeley Springs all have the same sort of transportation problem, for the quarries are on one side of the concrete highway and the plant is on the other, at a much lower level, the loading track for the finished product being at the bottom of the hill. There is a ridge of waste rock (either shale or a poor grade of sandstone) between the quarry and the road and at some quarries this ridge has been pierced by tunnels and in others by an open cuts.

Mule haulage is used in some quarries, steam dinkies and gasoline locomotives in others. In still others the cars run down to the plant by gravity and the empties are pulled back by mules or locomotives. The cars vary in size, but a low wooden body, end-dump car, holding about two tons, would seem to be as near standard as anything. These are best adapted to hand loading. The Pennsylvania company employs a different style of equipment because it loads with a steam shovel.

Crushing Practice

At the plant the cars are dumped into a loading hopper that will hold about a half day's run. The first stage of crushing is given by a jaw crusher of the Blake type, made by the Lewistown Foundry and Machine Co. At the Berkeley plant water is used to wash the fines down through the crusher, which gives an evener feed and prevents clogging. There is no grizzly, all the rock, coarse and fine, passing the crusher. One crusher, which seemed to be of an average size, had 18x30-in. jaws and they



Crushing and washing department of the plant of the Speer White Sand Co. This is one of the oldest near Berkeley Springs

Pipe to convey sand from washing plant to drainage house, Hazel Atlas Glass Co. Two or three producers use this same method of conveying

were set to about a 6-in. opening.

The product of one jaw crusher is usually fed to two Lewistown "chaser mills." This seems to be the only machine used in the district for reducing the rock to sand size. It is a variation of the old Chillian mill, once so much employed in crushing quartz ores, and is the same machine that is called a "wet pan" in the clay industry. There is a 9 ft. diameter pan in the bottom, of which is a circular track about 7 ft. in diameter. Two heavy rollers or solid wheels run on this track at a speed of 40 to 50 r.p.m. These rollers are 5 ft. in diameter and 8 in. wide on the face. They are hung on a horizontal axle that passes through a block that can slide up and down on a vertical shaft. This permits the rollers to rise if they meet anything they cannot crush and it also allows the weight of the rollers to hold them down to the track.

Chaser Mills Proved Best by Long Experience

This type of mill is both a grinder and a crusher. Primarily it crushes the rock by the weight of the rolls. But as the rolls pass around a circle the outer edge of the rolls has to go farther than the inner edge and hence there is some sliding or grinding action on the rock. The tires of the rollers tend to wear to a conical shape, which reduces this grinding action.

The discharge of this mill is through plates with ⅞-in. perforations set around the track of the rollers at an angle of 45 deg. As the rollers turn they throw a wave before them and this helps to carry the crushed material through the perforations and also to wash off anything that might clog the perforations.

The machine would seem to be very well adapted to the work it has to do, which is probably why it has never had any serious rival in the silica sand field. This work is to disintegrate the sandstone and reduce it to the original grains, but not to crush these grains. Tube mills have been tried on this work, but they broke the grains too much, causing sliming. Rolls, so much used in the dry crushing of silica sandstone, have never found a place here, and if they would work it is hard to see where they would have any advantage over the chaser mill. The quantity of water used in the mill is not large as it might have to be with some other machines in order to get good separation of the ground product. Taking everything into consideration, it is hard to see how any other device could more completely fill the conditions that have to be met than this mill does.

Screen Separation

Equally standard with the mill are the Lewistown revolving screens by which the ground product is separated from the mill discharge. There are two of these, one on either side of the mill. Each is 72 in. in diameter and covered with brass wire screen cloth 30 in. wide. A series of paddles on the inside of the screen lifts the oversize to a trough where water is added to wash it back into the mill.

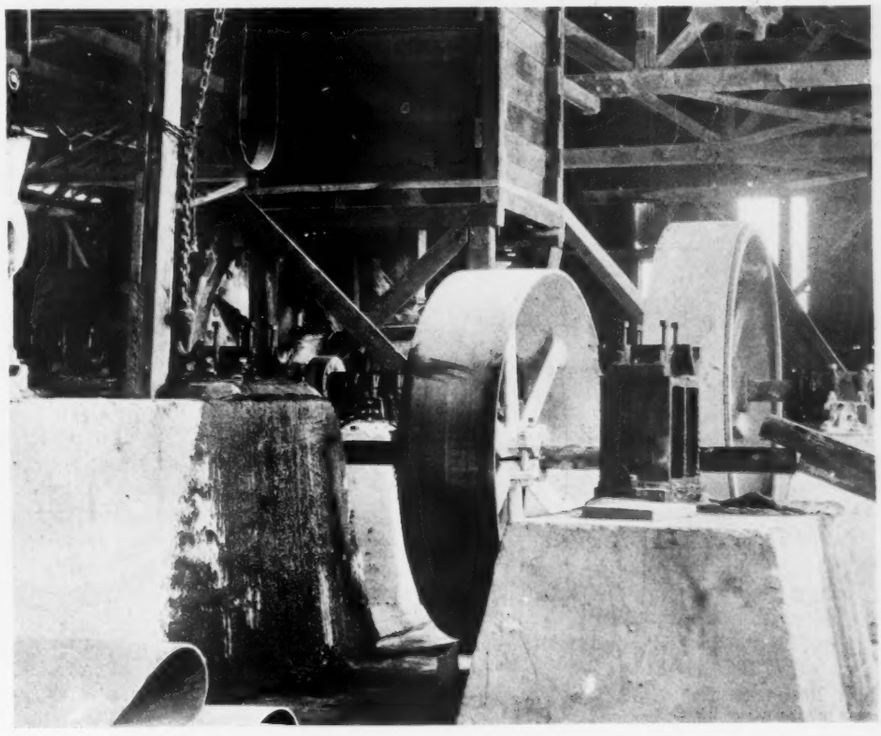
There is a considerable difference in the mesh size of screen used. In the Pennsylvania plants, near Mapleton, the standard screen seemed to be 10-mesh, but in this district 12 and 14-mesh seems to be in vogue. Since nothing coarser than 14-mesh is wanted in the final product, one would think that a 14-mesh screen would be the size to use. But the sand is to be screened again, after it has been dried, and it is probable that the use of a 10- or a 12-mesh screen so increases the capacity of the mill that it is cheaper to dispose of the small amount of oversize left from the dry screening in another way.

Washing and Cleaning

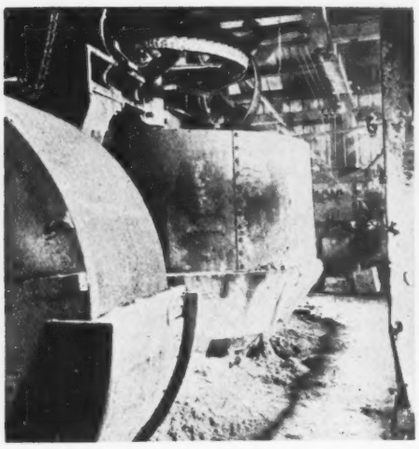
From the screens the sand and the water accompanying go to the sand washers. These are almost all of Lewistown make with 22-in. diameter screws. At the Millard plant and the Maryland plant the same type of washer is used, but as made either by Caldwell (Chicago) or Phillips and McLarin (Philadelphia). But all these makes are the same except in details of construction. Each consists of a screw in an inclined trough, the water flowing out at the bottom of the trough and the washed and dewatered sand at the other end, to which it is forced by the screw.

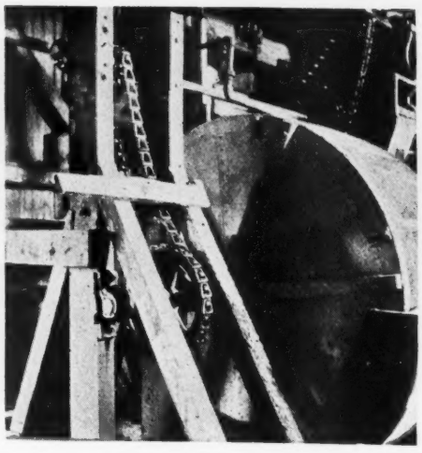
There are few mineral products that have to be so thoroughly washed in their preparation for the market as silica sand. Ordinary concrete sand is satisfactory, according to most highway specifications, if it is washed down to a 3% of clay, but that is about where silica sand washing begins. Everyone who has studied the theory of washing knows how hard it is to get the last traces of clay from sand by the settling out process. It may take as much water to get out the last 0.1% of the clay as it did the first 90%, perhaps more. An added difficulty in washing silica sand is that the last of the clay adheres to the grains as a film which cannot be removed without some scrubbing.

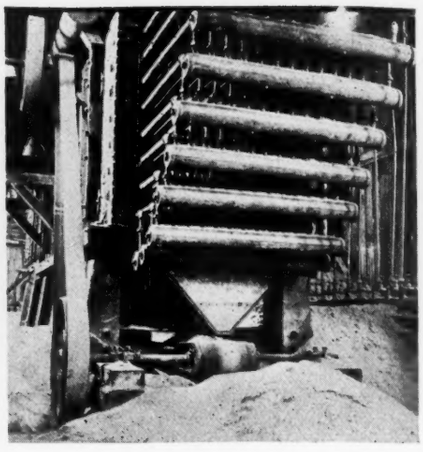
Practice in washing silica sand varies in different fields. In the Illinois field the practice is (or at least it used to be) to first sluice or pump the sand to concrete



Tube mill drives and feed bins—National Silica Products Co., Berkeley Springs, W. Va.







Left—The chaser mill and part of screen. Center—One of the two screens that go with each mill. Right—End of steam dryer. Note sand falling from conveyor underneath

tanks or cisterns until these were full of settled sand. The greater part of the clay was run off with the overflow from the cisterns. Next the sand is sent to Lewistown sand washers, with fresh water, which scrub it and send practically all of the clay that is left to the overflow. And to remove the last traces of clay the sand, after being settled and drained, goes to another set of Lewistown washers with fresh water. In the Oklahoma plants the process is much the same except that the settled sand from the tanks passes through a series of hydraulic elevators which scrub it thoroughly, and

Interior of a drainage house

as fresh water is introduced in each jet remove clay by the overflow as well. Finally the sand is given a rinse in Lewistown sand washers to remove the last traces of clay.

In the Maryland-West Virginia district the washing process depends wholly on Lewistown sand washers. These are in sets of four, or eight to each chaser mill. The only exception to this practice is found at the Speer White Sand Co.'s plant in which there are five Lewistown sand washers to a set, or 10 to each chaser mill.

The dewatered sand from the first washer is flushed down a trough to the entrance of the second washer and in the same way it is sent to the third and fourth washer. The overflow from the first washer is almost creamy in consistency with the clay that it carries. The overflow from the last washer is only tinted or opalescent with clay. Theoretically, five washings removing 75% of the clay at each wash would bring a 5% clay content down to .035%, or about 1/100 of the clay content that would be permissible in a "clean" concrete sand.

Pure Silica the Aim

This matter of washing silica sand has been gone into somewhat deeply, as it is the explanation for the larger and costly plants that have to be erected and the care that has to be exercised at every stage of the process. The ideal is a pure silica, something impossible to obtain by even the most careful washing and handling (except in a laboratory way). But in these plants every effort is made to obtain it as pure as possible.

The clay that is washed out is largely the "binder" by which the grains are held together in the sandstone. It is largely alumina, but also contains iron and lime. Of course some of the fine silica goes off with the clay, especially in the overflow of the first washer, but this is wanted. Glass sand can be too fine and hence the sand washers function as classifiers as well as sand washers, removing the fine grains in excess of those desired.

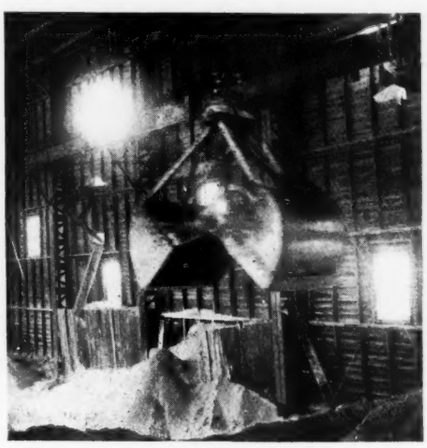
Drainage and Drying

The sand after its last rinsing goes to the drainage house. In some plants it goes there on a conveyor belt, in others it is transported by a stream of water flowing through a pipe. The Hazel-Atlas plant has an interesting installation of this kind in which the pipes are about 500 ft. long. They are of steel, but are inside drain pipes of clay to prevent the sand and water from freezing on to the pipe in cold weather.

The drainage houses are large warehouses with concrete floors on which the sand remains until it is as dry as simple drainage can make it. Some of these drainage houses must have a tonnage running into the thousands when they are filled. In some plants the dryer is in the center of the drainage house, where it can be filled from either side. In others the dryer is in a separate building, although putting the dryer in the center of the drainage house would seem by far the better arrangement.

Several methods are used to get the drained sand to the hopper of the dryer, but the best would seem to be the use of a traveling crane. This is the method used at the Hazel-Atlas and one of the Berkeley Sand Co.'s plants. At the other Berkeley plant an excavator (an ordinary bucket and belt elevator) is arranged so that it can be pushed to any part of the drainage house. This picks up the sand and deposits it on a cross belt also movable. The cross belt discharges to a stationary elevator that runs the full length of the drainage house and discharges into the hopper of the dryer. This device works well enough, but the operators say the crane is simpler and needs less attention and repairs.

An older scheme was the use of a stiffleg derrick at the side of the dryer which



A 5-ton traveling crane with 1 1/2-yd. bucket for taking sand from drainage piles to dryers

handled a tub into which the sand was shoveled by hand. According to the mill superintendent of the Hazel-Atlas plant, some 30 men were dispensed with when this arrangement was discarded and a 5-ton Shaw crane installed, handling a 1½-yd. bucket.

Steam Dryers Standard Practice

All the dryers noted were of Lewistown make. These are brick structures in which are sets of horizontal steam pipes; nine sets placed one above the other. Each set has an independent entrance valve for steam and exit valve for condensed steam or water. Having these sets independent makes it possible to apply the heat to that part of the dryer where it is most needed.

The dried sand trickles out of pipes into the bottom of the dryer on to a flat conveyor belt. It will not run out of these pipes until it is quite dry, and as the dried sand runs out hollow spaces are left in the body of the sand into which the wet sand caves. In this way the wet sand works down from the top. With a clean sand which cannot bake into lumps or pack on the sides, the work of this dryer is almost ideal. It is self regulating, for it cannot be overfed. And there is no danger of contaminating the sand with ashes or small particles of coal or coke as there might be with direct heat dryers.

Direct heat dryers were tried out in this field some years ago, but have now been altogether replaced by steam dryers.

The boiler for generating the steam is usually placed outside of the drainage house in a small brick building. Coal is used for firing. The same water is used over and over, an automatic pump feeding it to the boiler as fast as it is condensed in the steam pipes.

Dry Screening

From the dryer conveyor belts and elevators take the sand to the last stage in the process, the dry screening plant. These screens are placed above the storage bins in which the sand is held for shipment. Of course this part of the plant has to be very well built and quite weather-proof, for the sand having once been dried must not be wet again.

Two types of dry screens are used, a hexagonal revolving screen of Lewistown make and Tyler "Hum-mer" screens. The latter seem to be preferred since they are installed in the newer plants. The screens are covered with 14 and 16-mesh wire cloth to make two sizes of sand. The oversize of these screens is variously disposed of. In some plants it is allowed to pile up and is sold when possible for other purposes than glass making. In one of the Berkeley plants the oversize is returned by conveyors and elevators to the chaser mills.

Beside making two sizes of sand these screens have the important function of acting as guard screens, keeping out any trash such as pieces of iron or wood that might have got in by accident or large pieces of oversize that might come from the breaking of the rotary screens at the chaser mill. In other words, they are a guarantee not only of the size but of the purity of the product.

Shipments are made in tight box cars lined where necessary with building paper. All plants in the district use electric power.

Following is a list of the plants of the district and the personnel:

Berkeley Sand Co., office at Berkeley Springs. Henry P. Bridges, president; Nelson E. Perin, secretary-treasurer, and G. W. Hohannes, superintendent. This company is the largest producer in the district, having two washing plants with two chaser mills in one and three in the other.

E. F. Millard. This is not an incorporated company, Mr. Millard being the sole owner. F. C. Dunham is the superintendent. The plant has two chaser mills; office at Berkeley Springs.

West Virginia and Pittsburgh Sand Co. R. C. Ringold is manager. This company has two plants about a half mile apart not far from Berkeley Springs. Office, Berkeley Springs.

Speer White Sand Co. Office, Berkeley Springs. Mrs. K. Kuhn of Berkeley Springs is the principal owner. Hobert Reed is manager and S. T. Steiner is superintendent.

Pennsylvania Glass Sand Co. Main office, Pittsburgh, Penn.; this company has three plants near Mapleton, Penn., as well as the two plants here. It is the second largest producer in the district and its two quarries are notable for the high quality of the crude sand as well as the freedom from lumps of ganister. E. O. Banker is general superintendent of all the above named plants. J. K. Noel is superintendent of the Berkeley Springs and Roundtop operations. H. Walker is foreman at Berkeley and F. Sachs is foreman at Roundtop.

Hazel-Atlas Glass Co.; local office and plant at Great Cacaon; H. J. Catlett is manager; J. A. Procter, superintendent and G. V. Breig mill superintendent.

Maryland Glass Sand Co.; principal office, Hagerstown, Md.; R. J. Funkhouser is president; George C. French is superintendent at Hancock.

English Quarry Manager's Convention

A SUBSCRIBER to Rock Products writes: "I am obliged to lay off this coming year. I am going abroad for a while, where I can get a good drink. They sell only poison in the U. S. I just want to see how a good drink tastes a few times more before I die. P. S. I have things caught up pretty well now, so I can take some U. S. money over and have a little fun once more in my life."

For the benefit of our friend and any more like him who are contemplating a trip abroad we publish herewith the program of the coming convention of the Institution of Quarry Managers. We are assured any visiting quarry managers from the United States will be welcome.

Official Program

July 13—Monday Evening.—Civic Reception by the Lord Mayor of Bristol, Lady Mayoress, High Sheriff and Lady Sheriff, at the Art Gallery, 8:30 p. m.

July 14—Tuesday.—Charabancs leave Hotels in time to congregate and leave Tramway Centre, 9:30 a. m. prompt.
Arrive Sandford Quarries—10:30 a. m.
Depart Sandford Quarries—11:00 a. m.
Arrive Cheddar Caves—12:00 noon.
Lunch—1 p. m. to 2 p. m.
(Guests of Roads Reconstruction Co., Ltd. Mr. R. Bathurst, Managing Director.)
Arrive Emborough Quarries—3:00 p. m.
Depart Emborough Quarries—3:40 p. m.
Arrive Wells—4:45 p. m.
Tea—5:00 p. m. to 5:30 p. m. Guests of Messrs. F. M. Fry and S. M. Harding.

July 15—Wednesday: Charabancs depart from the Tramway Centre at 10:00 a. m. prompt.
Visits to places of Historical interest in Bristol, *or* to Messrs. Wills' Tobacco Factory.
Lunch at The Headquarters Hotel, 1 p. m. to 2 p. m., as Guests of Messrs. W. Bryant and W. M. Langford.
Afternoon: Annual Meeting.
Reading of Papers.
Annual Dinner.

Times to be fixed later.

July 16—Thursday: Charabancs at 10 a. m. prompt. Arrive at Avonmouth Docks at 11 a. m.
Inspection from 11 a. m. till 1 p. m.
Lunch as the Guests of The Port of Bristol Docks Committee, 1 p. m. to 2.30 p. m.
Inspection continued 2:30 p. m. till 4 p. m.
Arrive at Hotels 5 p. m.
Reading and Discussion of Papers at Headquarters, 6 p. m. till 8 p. m.

July 17—Friday: Charabancs 9:30 a. m. prompt.
Arrive Elm Park and Gorsham Bathstone Quarries, Bath (by kind permission of The Elm Park and Gorsham Down Bath Stone Co., Ltd., Mr. W. A. Shepperd, Managing Director), 11 a. m.
Depart 12:30 p. m.
Arrive Bath 1 p. m. Lunch as Guests of the Emborough Stone Co., Ltd. (Mr. F. P. Hillier, Managing Director).
Depart 2:30 p. m.
Arrive Messrs. Arnold & Co., Ltd., Quarries, 3:30 p. m.
Tea as Guests of Mr. J. H. Arnold, 4:30 to 5 p. m.
Call at Tytherington Quarries, and arrive Bristol 7:15 p. m.

School children who helped start the compaign

How We "Lime-Campaigned" With the School Children

In an Interview with Hazel Hankinson

By Griffith Richards
Soil Specialist, Wisconsin College of Agriculture

Miss Eva Benway, who directed the district school children at Union School

The Union School in Rock County which had a 100 per cent record in the lime campaign

LIME CAMPAIGNS here, and lime campaigns there! We thought the thing had been almost overdone, but nevertheless we decided to try just once more. And this is the way it was done.

A short time ago, with the aid of two of my co-workers, R. T. Glasco, agricultural agent of Rock county, and C. E. Culver, Farm Bureau secretary, a survey was planned to determine how extensive the need for lime might be in a given township consisting chiefly of farm land. For this survey, we chose Union township and decided to solicit the aid of the farm children.

To bring this about, we three men went among the eight school districts of the township, talking to the children and their teachers about the plan we had in mind. We explained to them how samples of soil were to be taken from each of the various farms. Then we told them how these samples were to be tested in a laboratory at the experiment station. It was in this way that the amount of lime needed would be determined.

Children Gather Soil Samples

Before long, those children, supervised by their teachers, were as interested and enthusiastic as anyone could wish. They were soon furnished with small paper sacks for the samples, and they set to work.

"Please may we gather some samples of soil out in your fields?" was the greeting many a surprised farmer received from a small boy or girl during the next few weeks. But no one was refused, and the work proceeded rapidly.

A sample of each forty acres of land in the township was taken, 576 samples in all, and the most of the work was accomplished by those children. One school, called the Union school of which Miss Elva Benway was teacher, succeeded in getting a sample from each forty in that district in a very short time, making the best record of any school. About fifteen children took part.

All of the samples taken were properly labelled and eventually sent to the soils department of the state College of Agriculture where they were tested for sourness. Thence, the results were mailed to the owners of the farms in Union township, and suggestions were given as to the amount of limestone thought necessary to sweeten the soil.

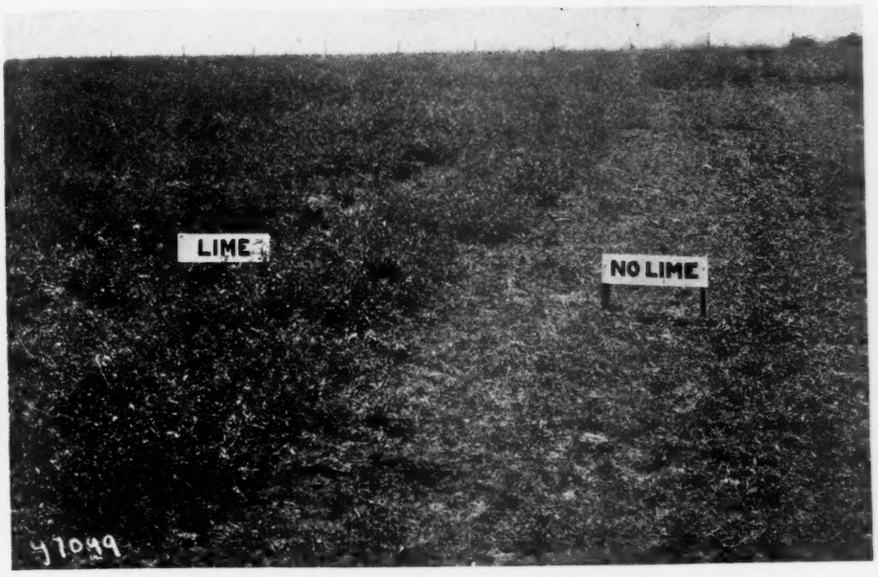
Farmers' Interest Aroused

Although southern Wisconsin is in the limestone region of the state, it is a well known fact that certain kinds of soil are very likely to become sour from the leaching out of lime. This is due chiefly to the heavy rainfall. Farmers, moreover, are well aware that clover and alfalfa do not grow as they should unless fields are fully supplied with lime. Farmers all over Rock county have been especially active in using lime for soil improvement, and the county has become a leader in the state in this respect. Union township, however, has gone several steps farther than usual this year on account of the lime campaign.

Previous to this time, two carloads, or about eighty tons, has been the amount placed on the land in this township during a year. But the survey showed that the farms required somewhat more than this. Hence, after the lime campaign was started, 1230 tons, which is more than fifteen times as much as before, have been pulverized for use by the farmers. About 200 tons, one-sixth of the whole amount, was used on two farms where farmer's demonstration meetings were held, and the rest of it was used in the near neighborhood.

We have proved that when farmers see in the field the better clover and alfalfa

Limestone outcrops along the highways were used for demonstration of the source and character of limestone



An old form of demonstration but one that is most convincing

where limestone has been applied, they believe, and they proceed to get limestone on their farms in spite of the low prices of farm products. They believe in planning how to get their soils in shape to raise the best possible crops in the future when better prices will undoubtedly be obtained.

The lime campaign in Rock county has been a marked success in all ways. The attention of the farmers has not only been brought to the need of greater amounts of lime on their land; and last, but not least, it has given the sons and daughters of these farmers a new interest in doing a bit to help make better the farms which are their homes.

Some English Experiments with Ciment Fondu as Binder for Macadam Roads

AN experiment in the efficacy of ciment fondu as a road binder is being conducted on a short stretch of road just outside Aylesbury on the way to Buckingham (England). Fully alive to the important question of road maintenance, the county surveyor (E. Winfield) decided to test the claims of this material, and the operations which commenced last week have aroused considerable interest. Several counties, including Leicestershire, Kent and Middlesex sent their surveyors to report on the test. The Ministry of Transport have also sent a representative to see the process in use and to test its qualities.

The examination of the road consisted of cutting out sections, one having been laid five days, and a second 24 hours, and both sections showed very satisfactory results. After the inspection a short conference was held, which brought out some criticism of the method of application of ciment fondu. J. Robinson remarked that road maintenance at the present time was something they estimated in hundreds of thousands of pounds, and they were glad to do what they could to help one another in connection with road upkeep.

E. Winfield, opening the discussion, said there were many methods today of preserving road surfaces, and in ciment fondu they had a fresh one. He thought there was something in it. He did not want to criticise, but he had had several arguments on the question of application. He did not agree with the method adopted, but in this he might be wrong. Dealing with the question of cost, Mr. Winfield said that in this county they had no local stone; they had to purchase the whole of the stone used. The costs of an experiment were bound to be high, and the approximate cost over the old mud-bound method was about 10d. a yard super. A rigid crust superimposed on a macadam road should stand, but, as he had said, the method of application was to his mind not the correct one, and he thought that with a little training they could do something better than they had done that day.

L. Cadic asked how could they make a success of cement as they were applying it and flooding it with water as they were today? They could do better, but that was the first idea. Ciment fondu was a hydraulic binder, which gave them means of tightening up a road quickly, and its application must be left in their hands. It gave them something that was extremely rapid, something that was extremely hard and extremely reliable. They had the element, and it was for them to see if they could use it properly. It was not being used properly today, but at the same time it was being used extensively, and they were getting successes all over the country.—*Contractor Journal, London, England.*

From the above and from advertisements in English papers we judge that the new French ciment fondu (fast hardening "fused" cement) is being advocated as a binder in macadam roads. The controversy seems to be whether it should be applied in the form of a grout, or as dust and the water subsequently sprinkled on.—The Editors.

Orcas Island to Have Modern Lime Plant

AMONG recent incorporations is that of the Northwest Lime Co. of Seattle, Wash., whose holdings include valuable limestone deposits on Orcas Island, where a modern lime burning and hydrating plant is to be constructed near the village of East Sound.

The plant will consist of the usual quarry equipment, cableway, shaft kilns, hydrator and auxiliary crushing and conveying units, and will be built by the Schaffer Engineering Co. of Pittsburgh, with whom the contract has recently been closed. Frank W. Schaffer, secretary of the company, is now in Seattle, and, together with their western manager, Percy E. Wright, is working out the final details for the construction.

In contrast to the kilns of existing plants in the Northwest, the Schaffer shaft kilns will be much larger, and will be practically automatic in their operation, the general dimensions being approximately 17 ft. in diameter by 78 ft. in height. They will be wood fired, and will have a capacity of approximately 25 tons of lime each in 24 hours. They will be provided with power-operated duplex draw shears, and will represent the most modern practice in lime burning. The Schaffer hydrator to be installed is also of a design heretofore unknown in the Northwest.

It is reported by the owners of the Northwest Lime Co. that their decision to install a modern plant was reached after a very thorough investigation of their property and of the existing markets. The plant will be under the supervision of a lime man who is now general superintendent of one of the largest modern plants in the East. The Seattle office of the company is 300 Mehlhorn Bldg.

Texas Lime Company Makes Blast in Record Time

AN unusual feat was accomplished recently at the quarry of the Dittlinger Lime Co. of New Braunfels, Texas, when 96 holes were drilled and shot in the short space of three and one-half hours. The holes were well-drilled to an average depth of 60 ft. and then loaded with 31,050 lb. of dynamite made into 6x14-in. Du Pont cartridges. The result of this quickly prepared blast was 97,286 lb. of well-broken rock. The success of the shot was attributed to the use of the large cartridges.

Problems in Cement and Concrete Research*

A Comprehensive Analysis of the Portland Cement Industry From a Scientific Viewpoint, Especially Written for Rock Products

By Dr. C. R. Platzmann
Berlin, Germany

SOME time ago I received a request from the editor of ROCK PRODUCTS for an article of a nature similar to that by Thaddeus Merriman[1], published in one of the issues. I am complying with this request most willingly as the proposed subject is extensive, vital, and interesting, and, because I am well aware of the fact that the United States claims a number of most valuable investigations in this field of applied chemistry, conducted both by the state and private concerns. I am referring particularly to the work of the Geophysical Institute in Washington, that of the U. S. Bureau of Standards and—last but not least—that conducted at the Lewis Institute in Chicago. I, therefore, hope that certain of my suggestions will fall on fertile ground. I realize that this article can present only a partial treatment of the subject, as it is limited in its scope, and can not give an exhaustive and complete review of all valuable work done in this field. I will, therefore, limit myself to pointing out the problems pertaining to each field.

It is exactly 100 years since portland cement was first discovered by the Englishman, John Aspdin[2]. It will appear amazing to those not initiated that, in spite of highly developed industrial and mechanical technique in the field of cement manufacture, we have not as yet succeeded, for example, in solving beyond doubt and question the complex problems pertaining to theoretical science; in other words, all investigations of the constitution of portland cement have not as yet led to a definite solution.

Today such investigations are based on the consideration of the three-component system—$CaO—SiO_2—Al_2O_3$—(see Fig. 1) since certain American investigators among whom Richards, Klein and Bates may be mentioned, have published a fundamental treatment giving all research a new direction and new methods. The real reason why the constitution of portland cement has not as yet found a generally recognized determination should be justly looked for in the fact that it is neither of purely chemical, nor of purely physical or mineralogical nature, so that none of the specific methods could lead to results altogether satisfactory, and that all research had to deal with combinations of the different methods. Aside from this, the nature and purity of the materials used for cement and the method of manufacture, i.e., the machinery used, are of utmost importance in all cement research work and, consequently, in the study of the constitution of cement.

Strictly scientific investigations should, therefore, start out with the purest materials; the process of manufacture should remain uniform throughout, and the samples of cement thus obtained, when sintered or fused in the laboratory, should be sufficiently large to allow mechanical and physical tests to be carried out along with chemical and petrographic studies. This is the only way to obtain results comparable with those of other investigations; that is to say, the samples used in the study of the constitution of cement should never be ordinary commercial cements, but should be specially calcined in the laboratory for this purpose.

European Opinions Differ From American

A difference of opinion is found today on the constitution of cement between American investigators and those of certain European countries, particularly Germany. Whether this divergence will gradually become obliterated, i.e., whether the existence of the single components ($3CaO.SiO_2$—$2CaO.SiO_2$—$3CaO.Al_2O_3$) advocated by the former, and the theory of solid solutions will be reduced to a common denominator in the future, will depend largely on how nearly the above methods for obtaining uniform results will be followed. This final stage appears the more distant as, for exact determination, the investigations should cover the *entire* field of the three-component system,[3] i.e., should extend beyond the area of portland cement and slags proper.

A great deal depends also on the reestablishment of mutual understanding between the different nations in the field of science. It is my opinion that an exchange of testing experience and publication of data, such as was advocated in 1918 at the Cement Congress held under the auspices of the Royal Faraday Society in London, can and will contribute greatly to this end. A scientific discussion of this kind with participation of scientists of all countries, representing the theoretical and practical viewpoints, would, in my estimation, have a much greater value than many a paper, which published once, is forgotten only too soon. Should an international committee be founded, the necessary center would be established, which would not only bring up points of interest but would also make all test data available. I will not discuss here the various phases of the activities of such a committee, as it might well form the subject of another paper, but I am anxious to bring it to the readers' attention as a suggestion.

Great Developments in Sight

That investigations of the $CaO—SiO_2—Al_2O_3$ system may bring amazing results has been demonstrated by the discovery of high-alumina cements[4] with highly hydraulic properties whose zone lies altogether outside of the portland cement zone. Although it does not appear probable that further combinations, i.e., complex compounds, will be found in the three-component system which will show similar high hydraulicity, an investigation and identification of each of the possible combinations within the three-component system might yield many a contribution, which, though indirectly, will throw light on the constitution of portland cement.

To what extent the different components may be replaced, as, for example, Al_2O_3 by iron oxide, and what are the conditions in a similar three-component system, for example, $CaO—SiO_2—Fe_2O_3$, particularly with regard to hydraulicity, are problems of the utmost importance, not only from a theoretical point of view, but largely from that of the manufacturer. The German cement plant at Hemmoor manufacturers today an "ore-cement" (Erzzement) which is manufactured as are all portland cements, and conforms to standard specifications, although it differs in that alumina is replaced by Fe_2O_3 (6 to 8%) and iron oxide by alumina (3 to 5%). Aside from that, this cement

*Translated from the German by M. G. Arronet.

[1]Some requirements in the study of portland cement, Rock Products, July 26, 1924, reprinted from *Engineering News-Record*, July 17, 1924.

[2]The article is being written in December, 1924.

[3]A valuable contribution was made by Dr. R. Grün (see *Zement*, 1923 publ.: Charlottenburg, Knesebeckstr. 74, Germany).

[4]See my article in Rock Products, p. 23, No. 19, September 20, 1924.

is exceptional in its resistance to the action of sea water.

Magnesia Must Also be Considered

A complete investigation of the three-component system will not indicate the end of research on the constitution of portland cement, as the commercial cements show combinations of four and more constituents, which will make further investigations more complicated and difficult.[5] The investigation of a four-component system, such as $CaO—SiO_2—Al_2O_3—MgO$, draws the attention of scientists and manufacturers to the part taken by magnesia and iron oxide in cement, though the standard process produces a cement conforming to specifications with the three fundamental constituents

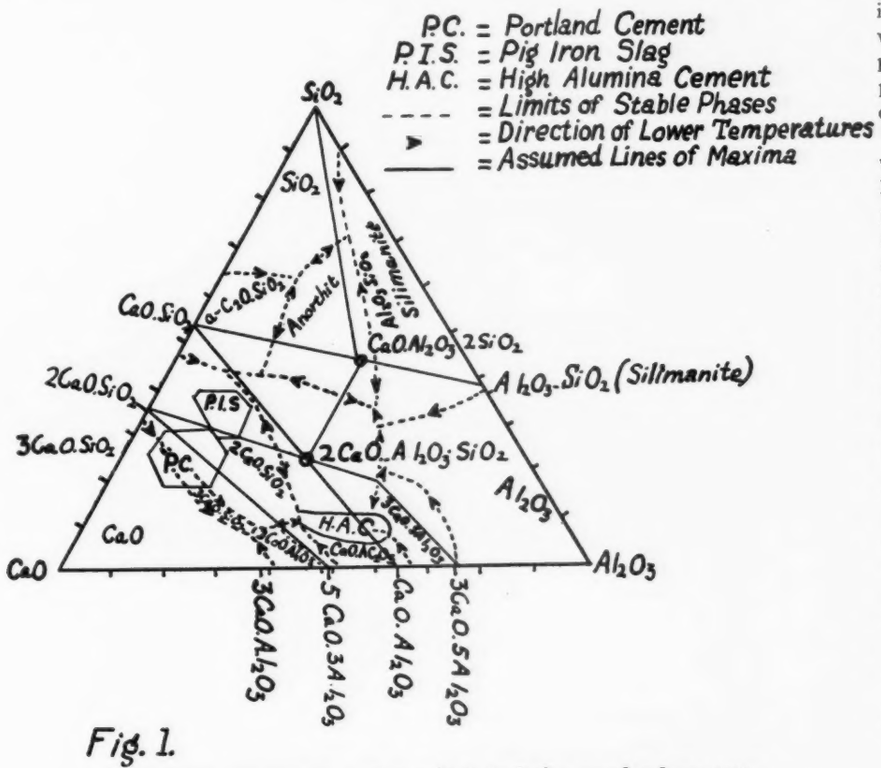


Fig. 1.

The three-component system which includes portland cements

CaO, SiO_2 and Al_2O_3. Accepting the assumption that Fe_2O_3 acts as a means of fusion, no unquestionable explanation has as yet been advanced of the form in which Fe_2O_3 is present in the clinker, nor of the optical and mechanical characteristics of such compounds.

Hydration and Hardening Processes

Concerning the chemical and mineralogical processes involved in hydration, classified as setting and hardening processes, the difference of opinion concerning the predomination of crystalline versus colloidal processes, has led to no definite solution. Assuming it as proven, mainly due to fundamental investigations made in America, that the formation of calcium aluminate plates and of calcium-silicate needles makes the process of setting mainly one of crystalline nature, and that the formation of calcium-silicate gel makes the process of hardening mainly one of colloidal nature, there still remains a group represented by the most distinguished scientist in cement research, Prof. LeChatelier in Paris, which has not as yet become a negligible minority and which still adheres to the theory of exclusively crystalline phenomena. As young a branch of science as colloidal chemistry will undoubtedly bring many an explanation of the processes of setting and hardening, particularly in as new a field as that of high-alumina cements.

Special High Strength Cements

Of particular interest next to the high-alumina cements have been within the recent years the special high-strength cements, such as are manufactured at Loruns (German Austria), Lobovitz (Czecho-Slovakia), Aargan (Switzerland) and, to my knowledge, in the United States as well. The demand faced by the manufacturers for a hydraulic cementing material whose high initial strength would permit the removal of forms after a few days so that foundations and roads might be made suitable for service, has led to the production of these special cements. The materials used contain a slightly higher percentage of lime than has been usual thus far; particular care is exercised in calcining these cements and their fineness is made to exceed the usual requirements. This does not mean anything new, as many brands of cement yield similar strengths. However, do these cements represent something new from the point of view of mineralogical composition? Further the question arises whether fusion, i.e., sintering carried out to completion produces higher strengths, and whether, in replacing sintering by fusion the lime content may be raised without producing unsoundness in the product.

Such tests have special reference to the problems faced by the manufacturers. I will not attempt to draw lines in as highly a practical field.

Wet vs. Dry Process

A few years ago R. K. Meade—well known in both theoretical and practical cement technique—published an extensive and highly interesting paper on the relative advantages and disadvantages of the dry and wet process. It seems to me that it is of great importance to emphasize the foregoing in this connection. Which raw materials and which local conditions favor one or the other process? Is the rotary kiln really the most perfect and the universal device for calcination?

It is that undoubtedly in all countries where cheap fuel is available in sufficiently large quantities and can be easily transported, whether it is coal, oil or even oil shale (used both as ingredient and as fuel) as practiced in Estonia today. However, this does not apply to the Oriental conditions. Fuel is scarce here or may be present in forms not utilized thus far; the methods of transportation denote an ass, a camel or, in the best of conditions, a truck or possibly a narrow gage railroad incapable of heavy service. Naturally the more economical vertical kiln will be predominant here. An intermediate position is claimed by a shaft kiln with movable grate—which may be a rotating or a reversible rolling grate or one with horizontal motion—(Thiele and Buhler grates). Which is the grate to be selected for a certain kind of materials may be judged from the advantages claimed by the manufacturers. To consider these questions alone would require a schedule which might fill volumes.

Kiln Draft Problems

Which is the most rational process of insuring proper draft in a shaft kiln is not as yet certain; whether it should be an updraft or downdraft produced by blowers or by an exhaust. I am inclined to favor the first method, although its effect varies with the nature of the materials and of the fuel; my opinion may appear partial in certain cases. A solution of this problem would be most desirable. We all know that the heat balance of the rotary kiln is poor, but we have not as yet found a more favorable method of fuel consumption. The Cottrell process advocates the recovery of dust from waste gases and its incorporation in the raw mix. Special reference should be made here to tests conducted by the Western Precipitation Co. in Los Angeles.

Potash Recovery

During the war the United States have sought to make up part of the deficiency of potash, formerly imported from Ger-

[5]To my knowledge Dr. Eitel was the first to discuss this problem in *Zement*, 1919.

many, by recovering potash fertilizer from dust, which, to my knowledge, this was largely discontinued on account of high cost. This process is still used in recovering dust by the Dalen Portland Cement plant A. B., in Brevik, Norway. The question arises under what conditions would the cost of this installation be justifiable.

It is doubtless that the nature of the materials and the local cost of electric power is of utmost importance in this connection. These impartially selected and briefly outlined problems pertaining to manufacture and machinery show that this field also presents many a problem requiring solution and that, in spite of the tremendous progress in machine design and construction (as an example consider the present-day crushing equipment) there is a great deal more to be accomplished in this field.

Revision of Standards

Merriman's article mentioned above emphasizes particularly the need for revision of standards, i.e., of testing methods. This problem is under discussion in Europe as well, as the Committee on Standards of the Association of German Portland Cement Manufacturers is now considering such a revision as a result of a suggestion which came from the recently deceased Professor Gary of the Materials Testing Laboratory, Berlin-Dahlem, one of the most distinguished figures in cement research.

In my opinion, the standard tests of cement show several imperfections and omissions both from the point of view of the manufacturer and of the cement user. The test of time of set made by means of the Vicat needle is unreliable, is greatly influenced by the personal equation and depends on such a large number of accidental factors, that the same cement when tested in different laboratories seldom yields the same values in spite of otherwise uniform results of time of set. The Vicat needle test, of sufficient accuracy for field tests, should be replaced in the laboratory by a device which would take into account the temperature at the time of test and would tend to eliminate as far as possible the personal equation. In other words, an automatically recording device should be invented. With regard to the Vicat test, it may be added that at least a record should be kept of the temperature of the air and of the mixing water.

Merriman recommends further a more extensive consideration of the tensile strength tests; he particularly recommends tensile tests of neat cement instead of the usual tests of 1:3 mortar. Though I cannot subscribe to these recommendations without further investigation, I must say that personally I regret very much that the 28-day tensile strength test has been eliminated from the German standard specifications (1909), as the growth of the cement products industry makes tensile stress more important than is generally assumed. It would be sufficient to point out cement roofing tile, where tensile stress is invariably produced by the load, as, for example, by the laborers repairing the roof (see Fig. 2). I believe, however, that the majority of cement users will be better suited by tensile tests of 1:3 mortar, as the contraction cracks almost invariably produced in the neat cement specimens frequently makes the data obtained unreliable.

The extent to which the contraction of cement should be accounted for in the standards is another very serious question of great importance to the cement consumer. Worthy of note is also the impact test (Zerschmetterungsfestigkeit) of 1:3 mortar specimens recommended some time ago by Dr. Passow, the noted discoverer of iron portland and slag cement. In view of the growing importance attached to initial strengths in concrete work, I should like

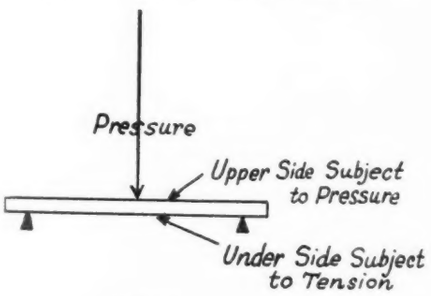


Fig. 2.

Illustrating bending stresses in cement roofing tile

to recommend a 2-day test to supplement the 7 and 28-day tests. This would be a means of giving the 2-day test data official recognition together with those of later ages (7 and 28-day tests).

The different methods of curing—air, water and combined water and air curing—undoubtedly causes a divergence in strength results. It seems important in this connection to achieve an understanding between producers and users of cement, as only rational co-operation can insure success. Whether we will be able to witness, within a reasonable time limit, the changes in the standards, corresponding to these suggestions made by Merriman, which are for the greater part most worthy of consideration, depends largely on the progress of purely scientific cement research. I believe, however, that many a year will pass and considerable work will be done, before the points emphasized by Merriman will find expression in changes of the standards.

The standards of all countries consider in a most prominent way the strength properties of cement. However, in many cases the cement user is interested, aside from strength, in some special property of cement, such as its resistance to sea water and wear.[6] It is most desirable, though not altogether certain, that standardization should be extended in this field as well. The account taken of the standards of high-strength special cements and special specifications for fused and high-alumina cements would signify a step forward. It is well to mention here that most standards protect only the portland cement, and that the generally recognized and valid definition of cement as hydraulic binder is missing. To introduce the latter seems to be in the interest of the consumer as it would afford protection against misleading representations of certain unscrupulous dealers.

[6]Dr. Nitzsche discusses this detail in *Zement*, 1922, Charlottenburg 2, Knesebeckstr. 74.

Effect of Storage on Cement

The effect of storage of cement and its most effective conservation were made within the last years the subject of an exhaustive investigation at the Lewis Institute (Chicago) by Professor Abrams. To make suggestions in this field would be to reduce the value of these investigations, which appear perfect to the most critical.

On the Uses of Cement

Concerning the uses of cement, the field of research becomes boundless. An incomplete review of this subject would fill volumes. I will, therefore, limit myself to a few special topics selected in an unprejudiced way.

Causes of Disintegration

The composition of a calcium-sulfo-aluminate, designated by Michaelis as "cement bacillus," is not clear to the present day. It is produced by the action of sulfuric acid or sulfates on concrete and was explained by Michaelis as absorption of 30 H_2O as water of crystallization [$3(CaO{\cdot}CaSO_4){\cdot}Al_2O_3 + 30\ H_2O$]. Candlot explains it on the basis of 120 H_2O water of crystallization [$2(3CaO{\cdot}Al_2O_3){\cdot}5CaSO_4 + 120\ H_2O$]. It is clear that in both cases the pressure of crystalline growth would cause cracking of the concrete; it remains to show which is the actual form and composition of the calcium-sulfo-aluminate produced. It has been frequently argued in industrial communities that the waste gases (SO_2) generated in the mills have a destructive action on cement roofing tile and are able to bring about its complete deterioration in a short time. If this argument is correct—which has not as yet been decisively proven, as no tests have been made reproducing these conditions—work might be done with regard to protection afforded by impregnation or by the advantages of special cements.

Repeatedly inquiries have been received from cement users pertaining to the resistance shown by concrete to various chemical agents. It is just as frequently necessary to work out the reply on the basis of a special series of tests even when literature on the subject is available, but does not cover exactly the same conditions. These difficulties and the prevalent ignorance of facts pertaining to properties of concrete show how necessary it is to raise the present status of experimental knowledge to a higher level. All those concerned with the building and manufacture of concrete storage bins, concrete pipe and concrete foundations will appreciate the value of such tests.

Calcium Chloride Problem

Recently, there appeared a report of tests made by V. Frost in Sweden[1] which claims that an addition of calcium chloride in the mixing water insures concrete against frost action. The effect of calcium chloride on constancy of volume, on compressive and tensile strength, on the evolution of heat during setting is also an interesting chapter in the chemistry of cement. It has been made the subject of extensive test series conducted by the author and shall be mentioned later. A final solution of this problem has not as yet been reached.

The Aggregate Problem

In closest relation with applied cement chemistry are problems of selection of aggregates and their specific suitability for the proposed use of concrete. For example, Kleinlogel's "Stahlbeton" shows that an aggregate was found which not only caused the concrete to yield strengths up to 700 kg. per sq. cm. but also produced a high wearing resistance, exceeding that of all natural rock. The aggregate is of metallic nature and of fixed size. Tests made by the author show that a partial substitution of an aggregate of mineral nature for the metallic constituent results in practically the same strengths, effecting, at the same time, an important reduction in cost. The work done by Professor Abrams should also be mentioned in this connection, as his tests represent an extensive study of the nature and grading of aggregates. The significance of these features for the construction of concrete silos, abrasion surfaces, large ore hoppers, as well as surfaces exposed to heavy traffic, needs no further elaboration.

Effect of Acids and Salt Solutions

It is still maintained today that acids and salt solutions have a detrimental effect on concrete. The high-alumina fused cements —ciment fondu, ciment electrique—prove that it is no longer impossible to produce special cements which will resist the aggressive action of certain chemicals. The impregnation of concrete surfaces with protective compounds, as practiced thus far, has mechanical disadvantages and is effective only at atmospheric temperatures, *i. e.*, is in need of perfection. Thus far concrete has not been exposed to high temperatures over 300 deg. C. The author succeeded in producing in his tests—a patent being applied for in the United States for this process—through special selection of aggregates, nature, mixing proportions and grading—a concrete which is not only able to withstand a temperature of 1000 deg. C. but is also able to resist the aggressive action of combustion gases. The importance of this product will be grasped not only by the builder of furnaces and concrete chimneys, but by any structural engineer able to appreciate the value of special fire-resistive properties. It will be thus realized that the field of cement uses, which has apparently been sufficiently studied, is in need of many an additional investigation whose completion might lead to opening further fields.

We will approach these big problems waiting for solution with a cheerful spirit and we will hope that the second centennial era of cement research will bring not only equally great progress, but that this work will enrich and benefit both science and industry.

[1] *Teknisk Tidskrift Vadg*—och Vattenbyggnadskonst., No. 1, 1924.

North Carolina Talc Industry Progressing

Demand for Both True Talc and Pyrophyllite Said to Be Increasing

THE North Carolina Geological and Economic Survey* reports the following:

Organization of the Cherokee Mines, Incorporated, of Biltmore, with the announcement that it holds 1000 acres of talc lands, promises a revival in the industry of producing the true magnesium talc comparable to the resumption of activity in the Moore County field of pyrophyllite, the latter an aluminum silicate with many of the qualities of the mineral from which it takes its name of "talc," but capable of being produced commercially only in much coarser grades.

True talc was formerly produced in quantity in North Carolina chiefly in Cherokee and Swain counties, although deposits have been worked at Marshall, in Madison County, and it has been found in Ashe and some other of the western counties. In the 1890's it was an important industry, and from the North Carolina field was marketed a very large proportion of all the talc used in the country. With the development of the Gouverneur field in New York State, however, North Carolina talc mining declined in importance and practically ceased in 1920. It is known, however, that there are large quantities available over quite an area, and renewed production in quantity may be reasonably looked for.

Occurrence of True Talc

The true talc, or magnesium silicate, occurs in lenses and masses in connection with limestone metamorphosed into marble. In the process of metamorphism the silicates, chiefly tremolite, are in turn altered into talc. As the mineral occurs in western North Carolina, it is not infrequently found in pencils, half talc and half tremolite. It has been found from Hewitt's, in Swain County, practically to the Georgia line, occurring along the edges of the marbles of the Nottely River Valley. It has also been reported recently at Peachtree.

High Versatility

Talc in commerce has from 50 to 75 well-established uses, and these are constantly multiplying in connection with many kinds of manufacture. In the nineties it was used in quantity in the making of gas tips, but the decline in this has been more than compensated by newly developed uses. For instance, talc is an essential of modern roofing. Every automobile tire has called on the talc mine for necessary constituents. It is a filler for all grades of paper. In textiles, talc is used in dressing, coating, sizing and bleaching, in dyeing, dry polishing, etc. In soap it is a filler and constituent of soap compounds. It is an ingredient of asbestos shingles. In cotton rope, silk-making, paint manufacture it is a necessary aid. Even sheet asphalt needs its talc, a mineral so smooth and feathery that it serves almost as a lubricant.

For most of these purposes, both the aluminum pyrophyllite and the magnesium talc are available, with the exception that where a high-grade product is necessary the call goes to the "true" or magnesium type. Thus, while pyrophyllite is used as a filler for many ordinary grades of paper, the heavy white papers, the fine bonds, etc., depend on the true talc. And when it comes to toilet articles, to the powders and cosmetics that fill the vanity boxes of the day, it is the talc such as is found in association with marbles that has the call.

Demand for both true talc and pyrophyllite has been very strong for several years and is constantly increasing. This is well shown by the increase in the value of the products from the Moore County field, which was $89,290, as against $17,048 in 1921, with several new companies organized to operate in 1924 and 1925.

In pyrophyllite there was a revival of the industry after a long lapse in production following the Civil War, and in the true talc the development of rich mines in New York State caused North Carolina operators to cease after the exhaustion of the particular lenses on which they were working.

In the case of pyrophyllite it is estimated that there are deposits sufficient in amount to support several mills for a hundred years.

As to the true magnesium talc, there are available no accurate estimates, but it is known that it can be found in quantities everywhere in the well-defined veins of marble occurring in western North Carolina.

*Natural Resources, April 18.

Hints and Helps for Superintendents

Carbon Dioxide Recorders

By W. F. SCHAPHORST, M.E.
Newark, N. J.

WHEN such a thing as a CO_2 recorder is mentioned to the average lime plant superintendent he is liable to take on a confused air because he doesn't know what CO_2 means, and feels that he is wading in beyond his depth in attempting to converse on such a subject. This CO_2 belongs to the realm of chemistry and not in plant operation according to the notions of the average superintendent.

There is nothing really complex about a CO_2 machine, however. The superintendent doesn't necessarily have to know anything about chemistry, even though combustion is a chemical process. He needn't even know what the chemical symbol CO_2 means.

Continuous records are now made by a reliable machine that works automatically as long as it is in working trim. To keep the machine in order is not a problem of chemistry, but one of mechanics, or perhaps some superintendent would prefer to call it "engineering" in which case the engineer will fit into the job very well. Many engineers—thousands of them perhaps—are daily attending to their CO_2 machines and recorders and are doing their work perfectly. Yet they don't know any more about chemistry than any other average man who has never dabbled in chemistry.

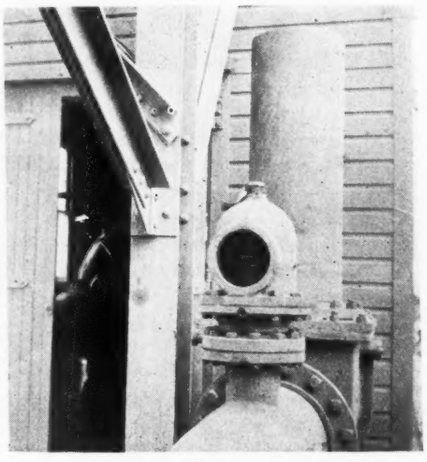
Should you install a CO_2 recorder in your plant you will find it a good plan to instruct several men in its care, if there are "several men." There is no reason why the foreman alone should be able to care for it. In fact, it is better for the chief to assign the duty of keeping the analyzing machine going to a subordinate and make it his regular job. Should the chief attend to all such details himself he will certainly overlook them on days when he considers other work more important.

Protecting Pump Discharge Lines from Shock

WHEN reciprocating pumps, usually steam driven, were in use it was the regular thing to put an air chamber on the discharge line to reduce the effect of "water hammer" which was caused by the pulsating discharge of such a pump. Centrifugal pumps came in and the air chambers in most cases were not needed so their use was discontinued. There are a good many persons running pumps and even installing them who never saw an air chamber on a pump line and who would not understand its use if they did.

However, in certain cases the use of an air chamber with a centrifugal pump is justified and one such case is shown in the accompanying picture. The air chamber and also a relief valve (the same in principle as the safety valve used on boilers) are installed on the discharge line of a 16-in. centrifugal pump at the Manor plant of the Charles Warner Co., near Tullytown, Penn. It was found that when the power went off suddenly the pump and line received a severe shock and to minimize the effect of this shock the air chamber and valve were introduced.

Wherever there is danger that a pump line may be obstructed so as to cause undue momentary pressure it is a good idea to protect a pump in this way. It is also necessary to protect with a relief valve when there is liability of the suction being obstructed.

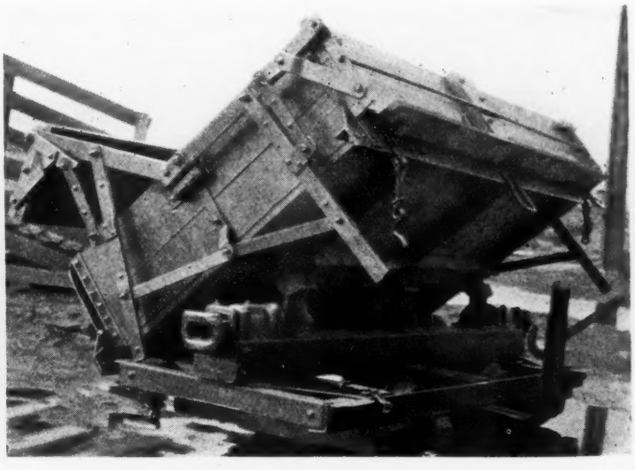


Air chamber used with centrifugal pump to prevent water hammer

Dump Cars Used by J. L. Shiely Company

THE J. L. Shiely Co., producers of crushed stone, sand and gravel, are also contractors of many years' experience. A special contractors' type of self-dumping car has been developed. It is shown in the two views below. The corner chains and hooks, released by a blow with a hammer or bar, have been discarded and a center latch substituted. The center loop, shown in the view to the right, is held in place by a hooked lever, and is readily released by a slight upward pull. The body is off center and dumps by gravity, as is the usual method with cars of this type. There are many varieties of sand, gravel and quarry cars. The editors would like to hear from plant superintendents as what they like best.

Shiely self-dumping car with dumping side fastened down

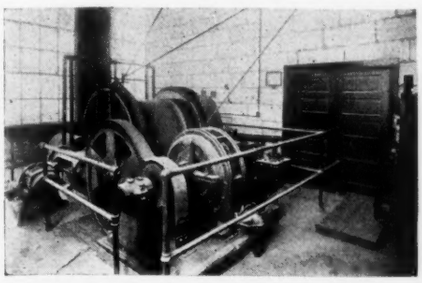


Shiely self-dumping car with center catch released

Preventing Shocks from Starting Boxes Located in Damp Places

IN a good many of the plants found in the rock products industries starting boxes for motors have to be placed of necessity in damp places. This is particularly true in tunnels and other such places where water is bound to collect.

At the Fort Dodge, Iowa, plant of the



Rubber mat on wood box prevents danger to man who throws the switch

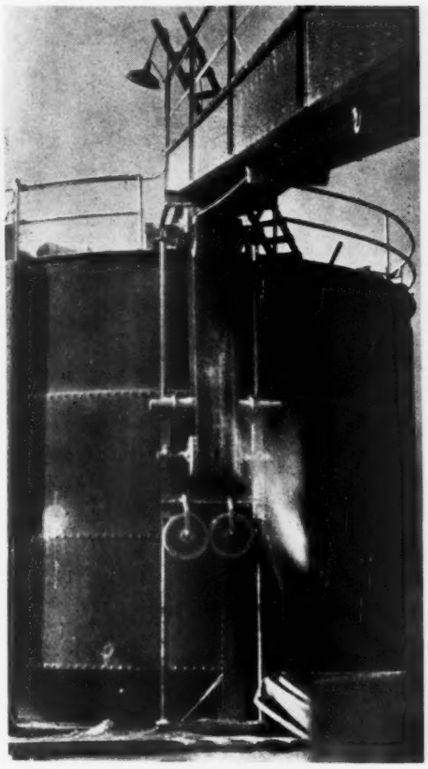
American Cement Plaster Co., rubber mats mounted on wooden boards have been placed at every starting box where there is any dampness. These serve as insulators and prevent employes from getting unpleasant if not dangerous shocks.

Another practice followed by this company is to have a half-dozen fuses in every starting box so that in case a fuse does blow out it is not necessary for the employe to run to the stock room for another, thus losing a lot of valuable time. This simple precaution is a great time saver.

Home-Made Conveyor Take-Up Pulleys

AT the plant of the Sand-Lime Products Co., Detroit, Mich., home-made conveyor take-up pulleys are used that are unusual in many respects.

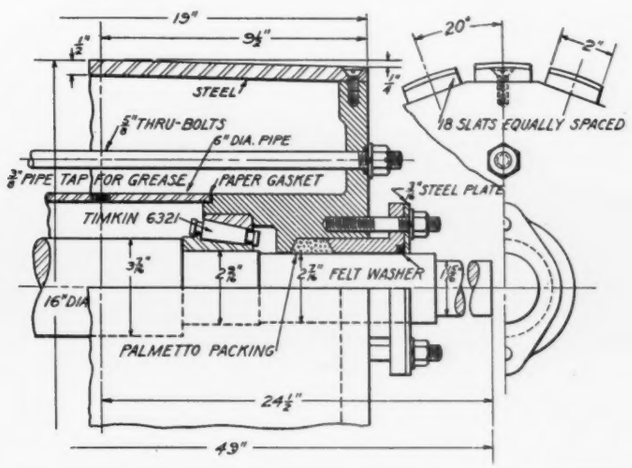
In the first place the pulleys are of the slat-type, as is shown in the accompanying sketch and photographs. The slats are placed 20 deg. apart, there being 18 in the pulley. Each slat is 2-in. wide and is fastened to the frame of the pulley by counter sunk screws. The pulleys are provided with Timken roller bearings and a large grease chamber and the company's experience has



Home-made take-up pulley

been that these pulleys will run for more than a year without any attention such as putting in fresh grease, oil or new packing.

This type of conveyor pulley-take-up operates more freely in cold weather than those with plain bearings and is sand proof. Actual records have shown less power consumption.



Details of the home-made take-up pulley shown in the view above

Bearings Made of Rubber

By W. F. SCHAPHORST, M.E.
Newark, N. J.

SOME users of bearings may not know that rubber is now coming into use to replace babbit metal and Lignum Vitae. Engineers have already gone so far in the use of rubber as to replace the babbitted stern bearing on a Diesel power tug with rubber. After having been used ten months, it has shown no sign of wear either on the shaft or the bearing. Some of the leading pump manufacturers have already adopted rubber bearings as standard equipment for their pumps.

Surprising as it may seem, the coefficient of friction of steel on wet rubber is even less than on an oiled babbitt surface, and it is reported that rubber will carry loads as high as 375 lb. per sq. in.

The principal advantage of rubber is that sand or grit will not cut the bearing, nor will it cut the shaft because the sand embeds itself into the rubber and in due time works out without doing any cutting or scratching.

Oil, of course, must not be used for lubricating as it would ruin the rubber. Water, and nothing but water, is the lubricant. This may amount to a considerable saving in lubricant and money.

The rubber bearing is provided with a spiral groove similar to babbitted and other bearings. A constant stream of water passing through this groove carries out any dirt or grit that may become embedded in the rubber and which is generally rolled out into the groove.

The progress being made by this new type of bearing will doubtless be watched with interest by all engineers.

Ball-Bearing Crane Motors

BALL BEARINGS on crane motors in the new Egyptian Portland Cement Co.'s plant at Port Huron, Mich., have been instrumental in saving the company considerable money.

In the clinker storage building an overhead electric traveling crane is used to distribute clinker in storage and also to feed tube mill hoppers. In handling this material considerable dust is created and it is of such an abrasive quality that the sleeve type bearing motors, with which the crane was originally furnished, would have to be overhauled once every six weeks. This trouble proved rather irksome as it affected the continuity of operation.

E. F. Rowe, chief electrician at the plant decided to try out ball bearings rather than sleeve bearings in these motors. The first installation was made August 8, 1924, and the bearings in the motors have not been changed to date. An examination was made January 1, 1925 and the ball bearings showed practically no wear. The crane operation is excellent since ball bearings were put in the motors. Fafnir ball bearings are used.

Volatile Matter—Its Effect on Lime Kiln Efficiency

Irregularity in Kiln Operation Thus Accounted For

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

CONTINUAL study of various kilns tends more and more to prove that one of the main reasons for kiln inefficiency is "irregularity" and that the main reason for "irregularity" is volatile matter in the coal. If one would fire with anthracite or with coke, the amount of heat generated would be to a considerable extent proportional to the amount of air passing through the fuel bed. With fuels containing volatile matter, this is not the case, due to the fact that volatile matter is driven off from the fuel in a very short time and regardless of the amount of air that passes through the fuel bed.

The lime men are in part mistaken in thinking that the most desirable coal for direct fired kilns is the high gas coal. This is not so. In fact, the reverse seems to be true. As a rule with the high gas coals, the efficiency will be lower when ordinary firing methods are employed because the irregularity will be greater.

The percentage of total heat in the coal that exists in latent form in the volatile matter varies with the quality of coal as follows:

Anthracite (Pa.)	8.0%
Semi-bituminous (Va.)	23.0%
Good grade bituminous (Pa.)	28.3%
Low grade bituminous (Ill.)	45.0%
Lignite (Texas)	54.0%

Much of Volatile Matter Lost

The incandescent fuel bed on the grate consists of practically only carbon and ash. Most of the volatile is driven off before incandescent condition is acquired by a fresh charge of coal. The air passing through the grate into the furnace must pass through this incandescent fuel bed, and U. S. Government tests show, that the amount of air that can enter through a grate with burning fuel on it, is never sufficient for complete combustion. When the fuel bed is in good condition and more than 4 in. thick, no amount of forcing air through the grate will increase the amount of air per pound of fuel burned.

The more air that is pushed through the grate, the more fuel is burned but the amount of air is never sufficient for complete combustion and secondary air admitted above the fuel bed is necessary if fuel is not to be wasted.

If complete combustion of carbon monoxide gas from the carbon on the grate cannot be obtained without secondary air, it is very evident that complete combustion of the gaseous-volatile portion of the coal cannot come to pass except secondary air is admitted above the fuel bed in addition to that required to burn the carbon monoxide of the fixed carbon portion of the fuel.

Secondary Air Necessary

It appears from the above that two streams of secondary air are necessary, one of constant volume which is to enter the furnace at all times and a second, of variable volume, which is to be admitted only when volatile matter is being distilled and is to be shut off when the distribution process ceases. To do all this correctly is, of course, extremely difficult; in fact, impossible when the firing is periodic or irregular.

Most kiln firing doors are poorly fitted and so ordinarily a considerable amount of secondary air enters the kiln around the doors. This method of admitting air is, however, very poor for the following reason:

Kilns ordinarily operate with very low, barely perceptible draft in the furnace and air enters through the fuel bed and some through whatever openings there are above the fuel bed. As soon as coal is fired, the volatile matter is driven off by the heat, increasing the volume of gas. Since kiln shaft capacity for moving the gas is limited, the increased volume in the furnace cannot escape and accumulates, destroying whatever vacuum is in the furnace and thus effectively preventing admission to secondary air. That this occurs is proven by the fact that in many cases, after firing, flame escapes from the furnace into the firing room. This all is very unfortunate since when the most air is required, the least is obtained; so rich, high-heat-value combustible gas escapes unburned and after volatile

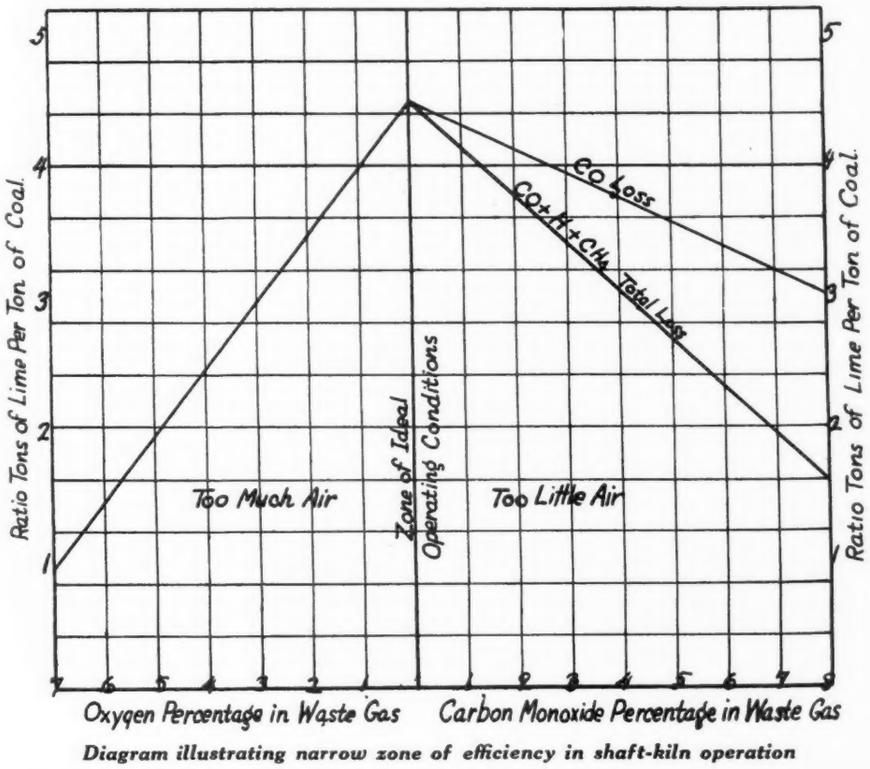


Diagram illustrating narrow zone of efficiency in shaft-kiln operation

matter is driven off, when the least air is necessary, the most will enter.

Too Little and Too Much Air Both Bad

When the fire is poor and under certain conditions such as when kiln draft is exceptionally good, or, when firing is very infrequent, there will be little or no loss due to incomplete combustion due to large amounts of excess air that will enter and be available for combustion. This condition, however, will be just as wasteful or more so, due to the cooling effect of unrequired excess air. The enclosed hyphotetical chart shows effect of both too little air for burning of fuel and too much air. It will be noted that the point of best condition is very sharp and the slightest deviation from the point of theoretical air requirement, will immediately greatly lower the ratio of lime made per ton of coal burned.

It appears peculiar, but it nevertheless is so to a great extent, that there is little difference in lime-coal ratio of a well operated and poorly operated direct-fired kiln. An explanation for this is that when a kiln is poorly operated, that is, when a kiln is in such a shape that air can leak into the furnace at many points, or when they fire infrequently and let the fire burn low down, or, when they maintain a fuel bed full of clinkers, or full of holes through which large amounts of air enter the furnace; or, when several or all of the above conditions exist, then lime-coal ratio will be poor due to too large amount of excess air, as represented by the left side of the chart.

Outlook Good for Building Industry

THE upward tendency of wages in the building trades seems to be definitely checked for this year at least, and possibly for two or three years, since in a number of the larger cities long term agreements at present rates have been negotiated, many of which will not terminate until 1927 or 1928. There has been a growing tendency on the part of contractors in many localities to make two and three year agreements in place of one year contracts, because it was felt that the longer agreements would tend to stabilize the industry and eliminate the uncertainty attending the negotiation of new contracts each spring.

The firm stand taken in the matter of refusing to consider wage advances this year by contractors in such important cities as Boston, St. Louis, Cleveland, Louisville and Washington, D. C., has done much to stabilize the industry generally. The victories won by the contractors this year in these and other cities present another strong argument in favor of organization. Singly or in individual trade groups, the employers would have been at the mercy of the unions, but when practically all of the contractors of an entire city as was the case in St. Louis and Boston put up a united front and collectively opposed increases they were in a position to attain their desired objective.

Now that the wage question is practically settled, it is expected that a vast amount of construction that was temporarily held up will be released and the remaining months of 1925 will no doubt surpass in volume the same period for 1924. It is doubtful, however, if the total for the year will be as great as that of last year because during the first three months of 1925 there was a considerable falling off as compared with the same period last year. According to the *American Contractor*, reports from 207 cities indicate that building permits issued in January fell off 4% from the January, 1924, record. February figures fell off 6% and March figures fell off 16%. New York City accounts for the greater part of the loss in that permits issued during the first three months of this year show a decrease of $161,000,000 as compared with the same period last year. Aside from New York, most of the larger cities show a good increase over last year, and in a number of cities where the figures are less the loss is very slight. Chicago, San Francisco, Atlanta, Minneapolis, Detroit, Kansas City, St. Louis, Cleveland, Philadelphia, Pittsburgh and Seattle are among the larger cities where the construction volume for the first quarter of 1925 exceeds that of last year.—*National Bulletin* of the Association of Building Trades Employers.

Orders Uniform Cement Rates

IN a report written by Commissioner Esch, in I. and S. No. 1996, cement from Kansas City, Mo., district to St. Joseph, Mo., and related points, and No. 15546, Iola Cement Mills Traffic Association vs. Atchison, Topeka & Santa Fe et al., mimeographed, the Interstate Commerce Commission found the proposed reduced rates on cement, from Kansas City and Sugar Creek, Mo., and Bonner Springs, Kan., to St. Joseph, Mo., and related points in Missouri would be unduly prejudicial and unduly preferential and ordered the suspended schedules canceled. It further found the rates, also on cement, from points in the Kansas gas belt, including Dewey, Okla., to St. Joseph and intermediate points in Scale II territory unreasonable, unduly prejudicial and unduly preferential of Kansas City and Sugar Creek.

As an adjustment in lieu of the state rates of Missouri it directed the carriers to establish, not later than June 29, rates made in accordance with the scale prescribed in Western Cement Rates, 48 I. C. C. 201, and 52 I. C. C. 225 for Scale II territory.

It was the position of the carriers, in these cases, that the adjustment made in that case should be observed, without exception, on both state and interstate traffic. The Commission, in this report, called attention to the fact that the object of that investigation was to unify the existing cement rate structure, to effect a non-discriminatory adjustment, and at the same time not to increase or to lessen the aggregate net revenue of the carriers derived from cement traffic. Mr. Esch said the rates and scales therein prescribed were designed to accomplish the purposes mentioned. He said it was intended that the carriers, in all cases, should observe the scales.

The Kansas and Missouri commissions were invited to participate in this case, but only the Kansas commission, the report indicated, took part in it. In disposing of the matter, the Commission said:

We find that the circumstances and conditions surrounding the transportation of cement over interstate and intrastate routes from Kansas City and Sugar Creek to St. Joseph and intermediate points, also from points in the Kansas gas belt, including Dewey, to the same destinations, and from Kansas City, Sugar Creek, and Bonner Springs to St. Joseph, Atchison, and Leavenworth and intermediate points in Kansas and Missouri are substantially similar.

We further find that the reductions proposed in the suspended schedules would result in undue prejudice to the Kansas gas-belt mills, including Dewey, and undue preference of Sugar Creek, Kansas City, and Bonner Springs, and that they have not been justified. An order will be entered requiring their cancellation.

We further find that the rates on cement, in carloads, from points in the Kansas gas belt, including Dewey, to St. Joseph and intermediate points in Scale II territory in Missouri are, and for the future will be, unreasonable and unduly prejudicial to said Kansas gas-belt points and Dewey over interstate routes and to shippers therefrom, and unduly preferential of Kansas City and Sugar Creek over intrastate routes to St. Joseph and to shippers therefrom and of intrastate traffic in Missouri between said points, to the extent that the rates from points in the Kansas gas belt, including Dewey, exceed or may exceed the rates contemporaneously maintained for like distances from Kansas City and Sugar Creek and upon intrastate traffic from Kansas City and Sugar Creek to St. Joseph and intermediate points in Missouri; and that any greater disparity in the rates from points in the Kansas gas belt, including Dewey, on the one hand, and Kansas City and Sugar Creek over intrastate routes, on the other hand, results and would result in unjust discrimination against interstate commerce from points in the Kansas gas belt, including Dewey.

We will order the removal of the undue prejudice and preference found by requiring the observance over all routes from and to the points covered by our findings of the Scale II rates prescribed in Western Cement Rates, computed in the manner therein prescribed and set out in the appendix to Iola Cement Mills Traffic Association vs. A. W. Ry. Co., 87 I. C. C. 451, 470, which we find will be just and reasonable for application on both interstate and intrastate traffic from and to said points.

—*Traffic World.*

Wisconsin Aggregate Association Moves Office

THE Wisconsin Mineral Aggregate Association announces the removal of its office on April 30 to rooms 6098-6102 Plankinton bldg., at Milwaukee, Wis. N. K. Wilson is the executive secretary of the association.

Modern Methods and Processes of Mining and Refining Gypsum*

Part VI—Mixtures and Formulas for Plaster

By Alva Warren Tyler

THE ingredients mixed with calcined gypsum or stucco to make up the different brands of wall plaster now on the market are both numerous and various and depend not only on the demand of the trade, but also on the quality of the gypsum itself.

The trade usually demands, of course, certain brands of plaster considered as "standard" although "standards" in one territory may not check with those in another. In other words, the proportion of ingredients for one territory may have to be changed quite materially to satisfy the demand of another. These demands may be due to either custom or local conditions involving either water or sand, or both.

Stuccos obtained from the different gypsum districts often vary quite widely in their characteristics, necessitating different treatment in one case than in another to give the proper working qualities.

Water Carrying Capacity

A stucco may be judged quite closely by its water carrying capacity—this test being the first one given it in the testing room with which all modern plaster mills are equipped. A rich working plaster will carry considerably more water than a short working product and will also carry more sand. Calcined gypsum from a given locality may run quite closely in these characteristics if all are similarly treated, while on the other hand they may vary quite widely if differently treated.

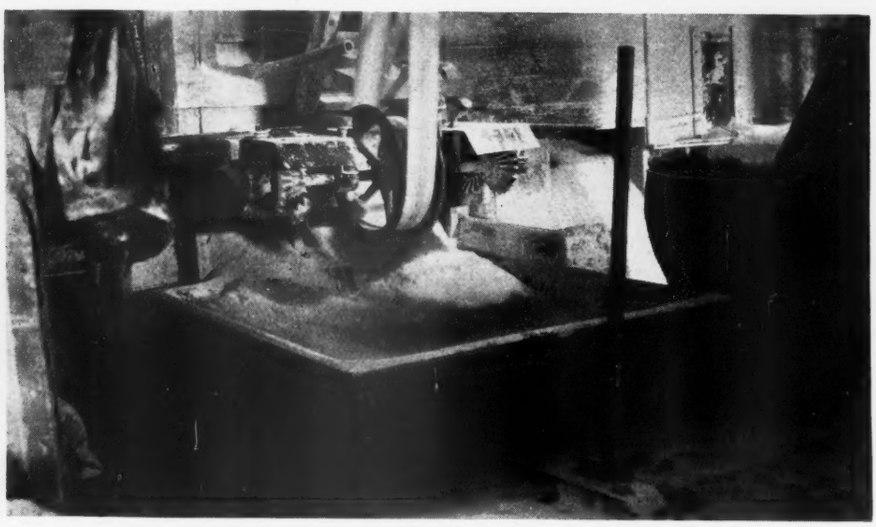
On account of the variations in character of plasters from different localities and due to different treatment, it will be seen that it would be practically impossible to write general formulas that would apply to all. A study of the characteristics of gypsum from each deposit is usually necessary before definite formulas can be specified and the best working qualities obtained. It is for this reason that one brand of plaster manufactured by one concern may be said to be better than another which may be manufactured in the same district. The one manufacturer may have developed a formula which will give better working qualities than the other, or one may have by special grinding or other special treatment produced a superior article.

Kinds of Plaster

In general, however, the various plasters, as known to the trade, may be classified as follows:

1. Unfibred Plasters.

Special machine for making long wood fibre for gypsum plaster



Measuring and mixing bin at gypsum plaster plant

2. Fibred Plasters.
3. Sanded Plasters.
4. Finishes.
5. Special Plasters.
6. Plaster of Paris.

Unfibred plasters are those made up of stucco and retarder only.

Fibred plasters are those made up of stucco retarder and fibre; the fibre being hair, wood fibre, hemp, or cocoa fibre.

Sanded plasters are ready mixed retarded fibred plasters to which the sand has been added in proper proportion so that when mixed with water the plaster may be applied directly to the wall.

Finishes are usually retarded stuccos to which may be added other ingredients to meet special requirements.

Special plasters are those of standard base to which retarder and other ingredients are added to give special charactertistics.

Plaster of Paris is simply the plain cal-

cined gypsum or stucco to which nothing whatever has been added.

Need of Retarders

It is very generally known that plaster of Paris (calcined gypsum) re-crystalizes or "sets up" very rapidly when mixed with water. This "setting up" action being merely the re-combination of the water with the stucco to return the latter to its original state, the amount of water taken up being exactly the same as that driven off during calcination.

Due to this rapid re-crystalization in the presence of water, it becomes necessary when using stucco for plastering purposes to retard the "set" so as to allow plenty of time for the workmen to place it on the wall and trowel it to its proper formation and surfacing.

"Retarder" is the term quite properly applied to the material introduced into a stucco mixture to control its setting time. By the use of this important ingredient (the process of manufacture of which will be described later) the setting time can practically be controlled at will, sufficient retarder usually being introduced to "hold" the set from 1½ to 3 hours.

To 1 Ton Stucco Add.....

1. Unfibred Plaster
   Retarder 6½ to 7 lb.
2. Fibred Plaster
   (a) Hair Fibred { Hair 2½ lb. / Retarder 6½ to 7 lb.
   (b) Wood Fibred { Wood Fibre 21 lb. / Retarder 4 lb. 4½ oz.
3. Sanded Plaster
   (a) Sanded Hair { Sand 4000 lb. / Hair 7½ lb. / Retarder 10 lb.
   (b) Sanded Wood Fibre { Sand 1430 lb. / Wood Fibre 35¾ lb. / Retarder 6 lb. 7 oz.
4. Finishes
   (a) Retarder 7 lb. to 7½ lb.
   (b) { Asbestos 470 lb. / Fine Silica 375 lb. / White Clay 59 lb. / Retarder 11¾ lb.

NOTE: All hair used in plaster manufacture is long, washed cattle hair or goat hair.

The wood fibre is made on special wood fibre machines producing a fine long fibre.

Sack filling room in a mixed plaster plant

Formulas for Mixed Plasters

Below are given formulas illustrating the different classifications of mixed plasters as outlined above. It will be noted that these formulas are all written in terms of pounds per ton of 2000 lb. of stucco used.

From the above basic formulas practically all of the others are derived; the "Special Plasters" usually being a variation of an enlargement of some one of these. Variations in finishes may be made in color for instance, by the substitution of a color for the white clay in (4b) or in quality by eliminating the white clay and asbestos. Lime, white cement, graphite, and other substances are all materials which play important parts in stucco mixtures to obtain special results. However, as noted in a previous paragraph, the correct mixtures and proportion of ingredients will depend largely on the character of the stucco.

The principal uses of plaster of Paris in its pure state, are for moulding or casting plaster and dental plaster. For these purposes a very high grade, finely ground product is required and special deposits where the highest quality of material—in both purity and whiteness—are chosen for its production.

(To be continued)

Contract for New Woodville, Ohio, Lime Plant Let

THE contract for the construction of the new plant of the Bruns Hydrate Lime Co. at Woodville, Ohio, has been let to Arnold and Weigel, lime plant engineers of Woodville, who have the general contract for kilns, hydrate plant and boiler house.

Another view of a sacking and shipping room at a mixed plaster manufacturing plant

Standard Gypsum Co. to Work Deposits on San Marcos Island

Will Combine Quarrying with Glory-Hole Mining — Plant Now Under Construction

(San Francisco Correspondence of the *Engineering and Mining Journal-Press*)

THE gypsum deposits on San Marcos Island, in the Gulf of California, southeast of Santa Rosalia, Lower California, have been obtained as a mining concession from the Mexican Government by the Standard Gypsum Co., of San Francisco. A mining plant, wharf, and living quarters are now under construction on the island. The development and equipment installation is being done under the direction of W. E. Hindry.

San Marcos Island is 90 miles southwest of Guaymas and 14 miles southeast of Santa Rosalia. The island is 2 miles wide and 5 miles long. The deposit of gypsum overlies the south end of the island, covering an area 1½ by 2 miles. The thickness of the occurrence varies from 75 to 125 ft. An abrupt fault terminates the deposit at the north, and makes the dividing line of the sedimentary rocks on the north end of the island. The gypsum is of sedimentary origin and is practically free from overburden. A number of samples indicate remarkable purity. Insoluble ranges from 0.5 to 0.75%; alumina and ferric oxide, 0.30 to 0.32; calcium carbonate, 0.44 to 1.03; calcium sulphate, 77.40 to 77.53; chemically combined water, 20.10 to 20.32%. The gypsum content figured from the analyses averages close to 97%, the range being 94 to 99%. The color ranges from light cream and gray to white.

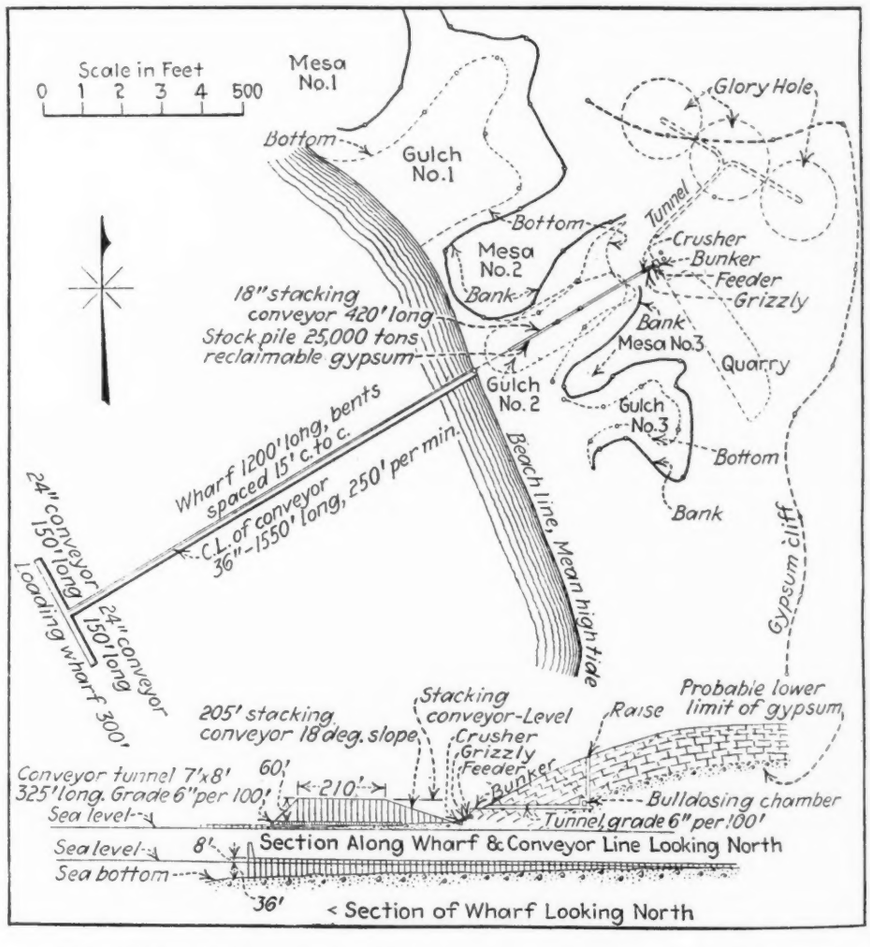
The island is cut by deep, straight-sided gulches characteristic of regions of intense aridity, and these have afforded opportunity of estimating thickness and of sampling. The deposit is unlike most gypsum deposits in Nevada and California, as it presents a semi-alabaster structure and is darker in color, though purer than most gypsum now being worked on the Pacific Coast. The estimated tonnage is very large.

The method of working proposed is by quarries and a system of glory holes placed along the strike of the formation and connecting with drifts leading to a main crosscut adit. This adit begins at the crushing unit. The general plan is shown in the accompanying figure. The gypsum will be transported in 3-yd. rocker dump type cars hauled by 4-ton Plymouth gasoline locomotives and dumped into a receiving bin. An apron pan feeder will discharge the gypsum over a grizzly and into a 44-in. jaw crusher (J. B. Ehrsam & Sons, Enterprise, Kan.). An 18-in. conveyor belt will remove the crushed gypsum and convey it to a vertical height of 60 ft. over the stockpile, which is to be 300 ft. long and will hold 25,000 tons live storage and 25,000 tons dead storage. A tripper will distribute the gypsum on the pile. A tunnel is to be dug underneath the stockpile and the live storage reclaimed through thirty gates equipped with automatic feeders discharging upon a 30-in. belt conveyor running the length of a 1000-ft. wharf. At the end of the wharf two 24-in. cross conveyors will be arranged to discharge into fore-and-aft hatches of steamers at the wharf. The trippers and spouts on these conveyors can be spaced a maximum distance apart of 400 ft. and at shorter lengths so as to serve any hatchway distance. The loading capacity of the system is to be 10,000 tons per twenty-four hours.

The power plant comprises a 200-h.p. Busch-Sulzer Diesel engine direct-connected to a 180-h.p. G. E. alternating current generator of 440 volts. All machinery is to be electrically operated. An Ingersoll-Rand compressor, 14x9x12, supplies compressed air for quarry operations. B.C.R. 430 Jackhammers are to be used for drilling and B. C. 25 paving breakers for breaking big lumps in the quarry. The gypsum drills readily, a 20-ft. hole being drilled at the rate of a foot per minute. A completely equipped machine shop is provided, with drill press, lathe, shaper, and necessary tools to make all repairs. Spare motors are also to be carried in stock for replacements. Power-drill-sharpening equipment is included.

Present plans provide for the erection of two calcining plants, one at Seattle, Wash., and the other at Long Beach, Calif., the former a two-kettle and the latter a three-kettle plant. The designs of these plants are now being made. At both, stockpiles of 15,000 tons' capacity will be maintained. Dockage facilities will be built at both places, so as to accommodate ocean-going vessels. Belt conveyor equipment will handle the gypsum, which will be unloaded from the vessels by clamshell buckets. The maximum-particle size of the gypsum as shipped is 3 in.

At both calcining plants, the lump gypsum



General plan of proposed quarry operations of Standard Gypsum Co.

will be reclaimed by a belt conveyor or system feeding directly into a 42-in. rotary crusher reducing to ½-in. and thence into bins ahead of Raymond mills, which will be of 5-roller low-side type, grinding to from 90 to 92% through a 100-mesh screen. The mill separators feed directly into the kettle bins. Screw conveyors transport the fine-ground product from the bins to the 10x8-ft. kettles, which deliver nine tons of calcined gypsum per charge. The kettles are oil-fired. A charge requires two and a half hours and a temperature of 340 deg. F. for calcination.

The calcined gypsum flows into 20-ton hot pits. The hot pits are served by a screw conveyor discharging into a bucket elevator and this in turn to storage bins. Ehrsam mixers and Bates automatic sacking machines are used in the final preparation of the finished products, which are fiber and unfibered hard wall plasters, casting plaster, finishing plaster, and land plaster. The Long Beach plant will have a capacity of 6000 tons per month and the Seattle plant a capacity of 4000 tons a month.

The Standard Gypsum Co. began operations at Ludwig, Nev., in March, 1923. Its plant at Ludwig has a capacity of 9000 tons per month. W. C. Riddell is chemical engineer for the company and Martin Uldall president and general manager.

Directors of American Refractories Institute Named

THE first meeting of the American Refractories Institute held at Pittsburgh, Penn., on April 14 was attended by 36 manufacturers of refractories and 26 technical men and representatives of the consuming industries.

After the program, as noted in the April 18 issue of Rock Products, was given, the nominating committee reported and the following men were elected to serve on the board of directors: To serve one year—F. R. Valentine, Woodbridge, N. J.; G. H. Diack, Lock Haven, Penn.; P. S. Kier, Pittsburgh, Penn.; E. F. Myers, Ironton, Ohio; R. A. B. Walsh, St. Louis, Mo.; F. J. Helwig, Pueblo, Colo.; W. L. Stapler, Atlanta, Ga. To serve two years—J. M. McKinley, Curwensville, Penn.; C. C. Edmunds, Pittsburgh, Penn.; C. E. Kapitzky, Cleveland, Ohio; E. M. Weinfurtner, Ashland, Ky.; C. S. Reed, Chicago; J. L. Green, St. Louis, Mo.; J. T. Toberts, San Francisco, Calif. To serve three years—G. A. Balz, Perth Amboy, N. J.; J. D. Ramsay, St. Marys, Penn.; J. E. Lewis, Pittsburgh, Penn.; Burrows Sloan, Philadelphia, Penn.; A. P. Taylor, Cincinnati, Ohio.

J. B. Shaw, head of the new ceramic department of the Pennsylvania State College, offered the services of the department for use by the institute in conducting research and testing work and promised hearty co-operation with the new organization.

Mine Rescue Contest

THE Fourth International First-Aid and Mine-Rescue Contest, open to all miners, quarrymen and workers in metallurgical plans, will be held at Springfield, Ill., September 10, 11 and 12 under the auspices of the Bureau of Mines, Department of the Interior, according to an announcement made by the Acting Secretary of the Interior.

These contests are held annually under the auspices of the Bureau of Mines, with the co-operation of the American National Red Cross, the National Safety Council and various mine operators' associations and miners' organizations, with the object of furthering the work of training miners in first-aid and mine-rescue methods, and the consequent advancement of the cause of safety among the million miners of the United States.

The first-aid and mine-rescue contests will be for international championships, and international contest cups, medals and prizes will be awarded to the winner. Proficiency of contesting teams will be determined in accordance with Bureau of Mines' standards by judges thoroughly familiar with first aid and mine rescue work.

All organizations interested in the contest are invited to enter one or more first-aid and mine-rescue teams. Entries will close at the Pittsburgh, Penn., station of the Bureau of Mines, August 26. No fee is required for entering a team, but all entries must be on or prior to that date in order that the necessary arrangements may be made for the contest. Entry blanks, together with the general rules of the contest, can be obtained from the Bureau of Mines, 4800 Forbes street, Pittsburgh, Penn.

U. S. Gypsum Enters Decorative Architecture Field

THE United States Gypsum Co. has added to its list of products Oriental Stucco, a combination of portland cement stucco-base and a stucco-finish prepared in nine colors and white. Both are factory-mixed and require the addition of water only before their application. The base is a compound of portland cement with other ingredients to make it water-resistive and plastic. It contains the proper amount of uniformly graded sand, which eliminates the possibilities of joinings showing through the finished surface, the trouble of adding materials at the job and danger of over-sanding.

The finish is a hydraulic lime base compounded with materials which make it waterproof and non-staining. Mineral colors are ground into it. Its ingredients are automatically weighed and mixed, insuring correct proportions and uniform color. Its formula is one that has been used successfully in this country for about fifteen years. Its setting time is regulated so that ample time is allowed for its manipulation by the mechanic. This material may be used over any construction on which any portland cement stucco is applicable.

This material is being presented to the building industry in conjunction with Textone, the plastic paint for interiors which the company put on the market last summer. The addition of these materials to the list of the company's products makes possible a complete wall-construction of United States Gypsum Co. materials; starting on the outside of the wood studding, Gyp-Lap sheathing covered with Oriental Stucco; on the inside Sheetrock wallboard decorated with Textone, or if plaster is desired, Gyplath, the fireproof substitute for wood lath, covered with gypsum plaster, decorated with Textone.

This paint and the stucco are being presented to the building industry by means of two books, one on each product, which comprise a history of the use of rough-textured walls in the historical periods of architecture and interior decoration. Each book contains colored and textured plates which show the combination of texture and tone available for the various styles. These textured plates are guides to contractors, mechanics and others for the reproduction of period-motifs in wall-treatment. A modification of this nomenclature has been adopted by the Portland Cement Association for its current campaign on portland stucco homes.

Oriental Stucco is being manufactured at present in the plant of the United States Gypsum Co. at New Brighton, N. Y. It is stocked at all the company's mills, and preparations are being made for additional production units.

Motor Truck Costs—and "Editorial Mathematics"

A CONSTANT and friendly reader writes: "I have read with interest and pleasure the article on the Dolomite Products Co. plant in the April 18 issue. He has an excellent operation and is developing it skilfully and wisely. Those of us who operate trucks are surprised to learn that a 5-ton truck can be operated for $12 a day; and it strains our credulity to the breaking point to learn that *three* 5-ton trucks, each of which can be operated for $12 a day, can be operated for a total cost of $24 a day! Is this direct from Mr. Odenbach or merely an example of editorial mathematics?"

No, it is not an *example* of editorial mathematics, but it is a case of editorial mathematics. Usually we do better—$12 is correct and $3 \times \$12 = \$36$, which is what the total cost should be. Incidentally, Mr. Odenbach has rebuilt certain features of these trucks and they are operated very efficiently. It should also be remembered that they never go out of the quarry and are operated continually under the watchful eye of Mr. Odenbach and of first-class motor truck mechanics who keep them always in the pink of condition. Their cost of operation therefore is not exactly comparable to trucks out on the roads.

Michigan and Pennsylvania "Soil Doctor" Trains Well Attended

New York Central Lines Helping To Sell Agricultural Lime and Limestone

OVER 1900 samples of soil were tested in the laboratory car of the soil fertility train which was operated through Southwestern Michigan by the Michigan State College and the New York Central lines during the first two weeks in April. This is at the rate of 75 samples at each meeting. Approximately 5000 farmers visited the train and consulted the "soil doctors" regarding their individual soil problems. Almost everyone started out by saying, "I do not know what is the matter with my land. I used to raise large crops of wheat, corn, and clover, but—." Almost invariably the diagnosis was: "Lowered fertility, accompanied with high acid pressure and low phosphoric resistance."

Over 90% of the samples tested showed a limestone requirement of at least two tons to the acre. Only two communities, Three Oaks and Quincy were the exceptions and even there over 60% of the soils showed an acid reaction. Again and again, the prescriptions read, "Two tons of limestone, 200 lb. of acid phosphate to the acre and plenty of legumes in the rotation will make your business profitable and will bring back your former large yields."

The feature of this train was the laboratory car, completely equipped to make these soil tests. It gave the farmer an opportunity to see his sample tested, discuss his problems with the soil experts, and receive a written report on his soil sample and specific recommendations. Dr. M. M. McCool, head of the soils department at the Michigan State College, said, "This is the only way in which our soil problems can be discussed. A sample of soil, the results of the tests, the farmer on his own ground, and the soils expert—that is the combination that gets results."

Another interesting feature of the train was the exhibit put on by the agricultural engineering department of the Michigan State College. A model of a home-made limestone spreader which can be built by any farmer in a few hours at little expense was shown. Plans for the same were distributed free of charge. The Musselman marl bucket, the first really successful bucket for excavating marl, was also shown in model form. H. J. Gallagher was in charge of this exhibit. Both of these devices have been developed and patented by Prof. H. H. Musselman, but are given to the citizens of Michigan without any royalties.

Besides Mr. Gallagher and Dr. McCool, Geo. Grantham, O. B. Price, and J. S. Hyde represented the college on this tour. J. A. Porter and Ezra Eby, senior students, were employed to do the testing. E. J. Leenhouts, agricultural agent for the New York Central Lines, was in charge of the train.

Many interesting reactions were noted from time to time. A farmer at Kalamazoo said, "You won't dare to run this train through this territory again because you would be swamped. Five times as many people will come out next time." At Battle Creek, where over 170 samples of soil were tested and over 450 farmers attended the train, A. S. Russel visited the train. Mr. Russel drove in from his farm in Assyria, nine miles from there, with eight samples of soil from eight different fields. When he discovered there were over 100 samples ahead of him, he said, "I am going to stick here until my samples are tested even if it keeps me till after dark. I have twelve cows to milk alone, 35 ewes to take care of, and 30 hogs to feed when I get home, but that is not going to stop me from getting the 'lowdown' on my soil. This is going to mean some real money to me."

He was good as his word. At 6 o'clock he was still in the laboratory car and when he left he said, "Boys, I have made more money this afternoon than I ever have any day on the farm. This information makes it possible for me to buy my limestone and fertilizers in the most economical way and to handle my fields in such a way that I will get the most out of them without robbing the soil. We are going to build a Simplex Spreader on the first rainy day."

"Touring Pennsylvania"

Twenty-two towns and communities were visited from March 16 to 31, inclusive, by the New York Central lime demonstration train in Pennsylvania. The train was operated by the Agricultural Relations Department of the railroad. R. W. Quackenbush, general agricultural agent, New York Central Lines, from New York City, and E. G. Reed, agricultural agent, New York Central Lines, Columbus, Ohio, were in charge.

Co-operating, were the Pennsylvania State College, the Pennsylvania State Department of Agriculture, Pennsylvania State Chamber of Commerce, the National Agstone

Michigan agricultural lime and limestone demonstration train

Association, the National Lime Association, the local farm bureaus and county agricultural agents, local civic associations and the farm press. In all 1,326 samples of soil were tested for over 1000 farmers and gardeners. 2607 people, mostly farmers or from farm families, visited the car. Every person for whom soil was tested was given a form completely filled out with the results of the tests and the recommendations of the soils and crops experts. Motion pictures on liming soils were shown to 600 people.

One-acre demonstration plots of lime and sweet clover were established on 62 farms in the territory traversed. These one-acre demonstrations will be under the supervision of the county agricultural agent and the crops specialists from the state college. They are for the purpose of determining the value of sweet clover as a soil builder and pasture crop in the rotations of Pennsylvania farms. It is not expected that sweet clover will prove of much value as a hay crop.

samples were for gardens and truck patches under five acres) it was found that only 361 of the fields, or only 35% of those tested, had received some liming material, once or more, in the past four years. Some 670, or 65%, of the fields had not had any liming material of any kind within the past four years.

The great need for lime was evident from the tests made. 434 of 1031 fields need 2½ (or more) tons of limestone per acre; 396 fields need from 1 to 2 tons per acre; 145 fields need from ½ to 1 ton per acre, and only 56 fields or 5.4%, were found to be neutral and not in need of lime.

Practically all of the farm soils tested were low in phosphorus. A very small percentage were high in phosphorus, a few more were medium. Quite a few were found to be very low or almost entirely devoid of phosphorus.

The average soil of those tested was found to be medium in organic matter and nitrogen although this ranged from high to very low. The average organic matter content, which was about 4%-5%, is considered good.

Fifty per cent of the fields tested had not had any commercial fertilizer in the past four years; 51% had not had any applications of farm manures in over four years; 64% of the farms did not have a definitely established crop rotation of three, four or five years. At least 50% of the farms were being operated on the "hit or miss" and "in and out" idea with no definite cropping, rotation or soil improving plan in mind.

The Soil Fertility and Soils Testing Train gave these farmers, as well as others, something to think about. Some of the slogans carried on the car in large letters were:

"Many poor farmers are worn out from farming too much land, and much land is worn out by too many poor farmers."

"Lime—Lime—Lime, don't put it off, put it on."

"If you don't treat your soils right your crops will re-treat."

"Soil sense also refers to crop profits."

"You can't continually draw on your soils bank without bankrupting your crops."

These soils fertility and soils testing laboratory cars will be operated over the New York Central Lines this fall from September 14 to October 3, covering western Ohio, from Michigan to the Ohio river. The soils department, Ohio State University, will co-operate and furnish the soil chemists, crop experts and laboratory equipment.

Interior of the Pennsylvania lime and limestone demonstration train

The laboratory crew at work on demonstration train

The Pennsylvania State Chamber of Commerce, through its agricultural department, gave free to each of the 62 farmers 20 lb. of the very best sweet clover seed obtainable. This is ample to seed the one acre. Enough inoculation material was also given to properly inoculate the sweet clover seed with bacteria. Sufficient lime or limestone to lime one acre for each of the 62 demonstrators was given free by one of the following companies: The Michigan Limestone and Chemical Co., The Pine Creek Lime and Stone Co., The American Lime and Stone Co. and the Carbon Limestone Co. It required 1500 lb. of sweet clover seed, two cars of 30 tons each of ground limestone and two cars of 30 tons each of hydrated lime to establish these demonstrations.

Of the 820 farmers, having farms of five acres or larger, for whom 1031 samples of soil were tested (the balance of the 1326

Universal to Spend $250,000 on Improvements at Duluth, Minnesota, Plant

IMPROVEMENTS at the Universal Portland Cement Co.'s plant at Duluth, Minn., costing approximately $250,000, are planned for this summer, Ray S. Huey, superintendent, announced recently.

Plans are now being prepared at the executive offices of the company at Chicago provide for the construction of a new steel stack, 300 ft. in height and 18 ft. in diameter at the top, and the replacing of four old dust collectors. About six months will be required to complete the work.—*Duluth (Minn.) Herald.*

Alsen Cement Plant to Resume Operations in June

AN official of the Lehigh Portland Cement Co. has announced that the Alsen, N. Y., plant will be ready for operations in about two months. There is considerable work to be done to place the plant in shape for work and much new machinery and repairs are necessary. When the plant opens about June 1, its capacity will be greatly increased.—*Kingston (N. Y.) Freeman.*

Work of the Bureau of Public Roads

How the Government Tests Highway Materials and Carries on Research Work on Their Adaptability for Road Building

By Edmund Shaw
Editor, Rock Products

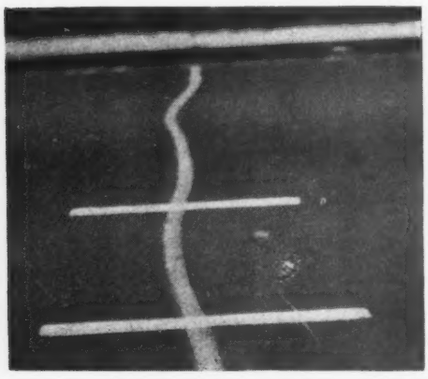
EVERYONE who reads ROCK PRODUCTS is more or less interested in the Bureau of Public Roads and probably 75% of the readers are directly affected by the bureau's work; that is, this work has a real influence on their business. For when Uncle Sam began to hand out money to assist the states in constructing highways he was canny enough to provide a means of seeing that the money was well spent. He put the disbursement of the money in the hands of the Department of Agriculture and the department established the bureau which tests materials that go into the roads and inspects the finished job. Also it carries on an extensive program of research, which is of the greatest value to road builders everywhere, not only in the United States but in foreign countries. For from being the country of the worst roads, this is on the way to become the country of the best roads, and foreigners are coming from many parts of the world to study our road building methods and processes.

I called on Dr. Goldbeck, chief of the Division of Tests, and was by him turned over to F. H. Jackson, in charge of routine testing and federal aid control, and E. B. Smith, engineer of tests in the division of research testing. Mr. Jackson had just returned from an inspection tour of federal aid highways in the Southwest and was sorting out a pile of notes and photographs. They were interesting as showing the tremendous field the bureau covers in its work, as they were mainly from the desert regions of Arizona and New Mexico. He left off to show the visitor through the laboratories which are in the same building as the offices. This is a rather old business building which the government has rented for use until the new quarters for the bureau which are projected can be built.

The main laboratory does ordinary analytical work, such as cement testing and the work on bituminous materials, which is in charge of G. A. Alderton. One of the interesting little things noted in this laboratory is a device for measuring the force with which briquettes of cement mortar are "thumbed" into the mould. The government master specification for cement says that the "thumbing" shall be done with a force of 15 lb. The briquette is placed on a board attached to a spring balance to register the force applied and in this laboratory that force is 15 lb. Recent research has shown that this is a very important matter. It is said to be possible to vary the strength test by too much or too little pressure in thumbing so that the same sample of cement might be either accepted or rejected if it were anywhere near the line.

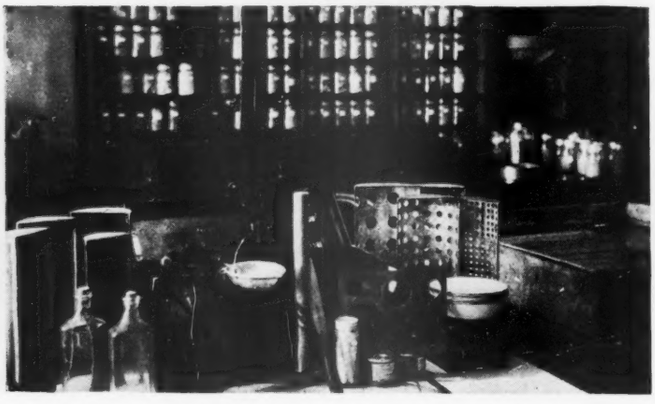
A Hardness Test for Sand

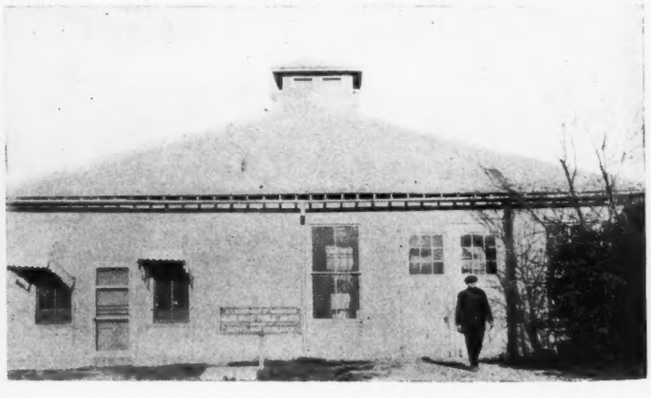
In the basement, work in the heavier kinds of testing was going on, such as the breaking of cylinders bored from concrete roads and the testing of stone by the Dory and Deval hardness tests. It is presumed that the reader who is interested knows about these, but there were some new tests being carried on of which the writer was ignorant. One of these was a hardness test for sand. So far it is in the experimental stage but it consists of first screening the sand into sizes and then re-combining certain sizes



A section of bituminous paving that crept under test

Another bituminous section that did not creep in the same test





Left—A complete outfit for testing aggregate supplied to inspectors. It packs into a small tin box. Right—One of the research laboratories at Arlington

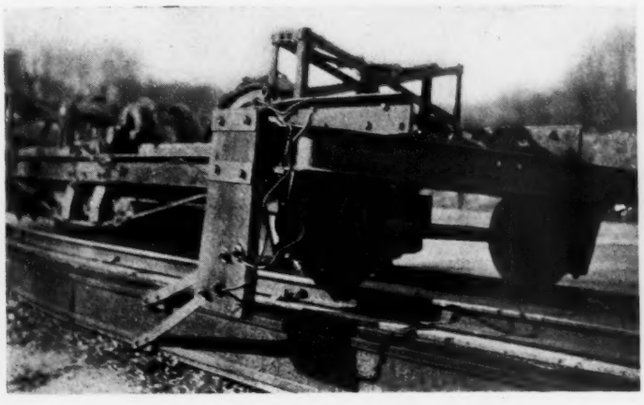
so that all sands tested shall have the same grading. All sizes below 100-mesh are omitted. The sand is then tested in the Deval testing machine, steel balls being added for grinding. The percentage of wear is then determined by weighing that part of the product which passes 100-mesh.

There are objections to this method of working and it may be modified. Experience has shown that the very hard and very soft particles of sand may lie in certain screen sizes, and in re-combining the screen sizes these very hard and very soft grains would not be in the proper proportion. It would seem better to test the sand "as is" and to figure the loss by some such system as has been worked out for the testing of tube mill products.

A New "Splash" Test for Concrete

Another new idea which has been worked out by Mr. Jackson will interest everyone who is concerned with concrete and aggregate. This is a measure for the consistency of concrete to take the place of the slump test. It has been repeatedly pointed out that the slump test sometimes falls down when applied to a mixture with coarse crushed stone aggregate. If the mix is very wet the stones will simply pile up and allow the cement and fine aggregate to drain away through the interstices so that the slump, as measured in inches, has not much to do with the water present. Mr. Jackson's device allows the mixed concrete to fall on a plate about two feet in diameter from a definite height. If it is wet enough some of it will flow to the edge and fall off. What is left on the plate is weighed and the consistency is calculated from this weight. Experiments have shown that within certain limits the weight of the concrete remaining on the plate is directly proportional to the water cement ratio, which is what is really wanted from any sort of slump or flow test.

Left—The circular track on which the accelerated wear tests on concrete paving and the "creeping" test on bituminous pavements were made. Right—The section on concrete that showed the greatest wear



Left—The motor driven machine that gave the concrete sections the accelerated wear test. Right—Tank for applying static load tests to concrete slabs. Weight is applied by running water into the tank

The Arlington Test Pavements

Research work on highway construction is carried on by the bureau at the experimental farm of the Department of Agriculture at Arlington. Much of the work is done out of doors but there are well equipped laboratories, although they are housed in temporary buildings.

There were evidences of the bureau's work to be seen even before the farm was reached for we passed a big truck with a recording machine for measuring the pressure on the tires. This part of the work especially interests makers of tires and automobiles. Matters of more interest to Rock Products readers are the test road where soils are treated with lime and portland cement, to make them fit for road bases, the road in which concrete slabs are tested for impact and above all, the circular track on which the accelerated wear tests have been carried out.

Probably no test on highway materials ever received so much attention as this test for accelerated wear, and the paper by Jackson and Paul has been abstracted and reprinted in many publications, including Rock Products, issue of September 6, 1924. There was a definiteness about these tests that anyone could appreciate and they were thoroughly practical. It was a new idea to some of us that concrete roads could wear out, and they never would wear out if only rubber tires passed over them. But icy weather calls for chains and chains are playing havoc with concrete roads in some parts. There is a road in Indianapolis, for example, that has been distinctly rutted by the passage of heavy trucks over it last winter. Ice often compels the vehicles to go in the same tracks and hence the wear, which has been especially noted during the past severe winter.

The Section That Showed the Greatest Wear

It was interesting to note that the section of concrete which showed the greatest wear was not made with either natural sand, slag, or stone screenings as fine aggregate. It

was made with "chats," the refuse of a mining operation, which is used as fine aggregate in states in the vicinity of the Mississippi. As to the comparative merits of other aggregates the reader is respectfully referred to the original paper or one of its abstracts. It is satisfying to note that this paper bears out the contention of the Portland Cement Association and the position taken editorially by this paper that *good* stone, *good* gravel and *good* slag are all good aggregates, and that they are satisfactory from the point of wear as they are satisfactory from the point of compressive strength.

Left—Road made of slabs to be tested for effect of impact. Loaded trucks follow the lines and are raised and dropped by passing over iron bars. Left—Piles of stone, slag, gravel and sand used for making test slabs of concrete

Left—Beams which have been broken in the flexure test to find the modulus of rupture. Right—A road containing sections of clayey soil which have been treated with varying amounts of lime and portland cement

Lime and Cement for Treating Sub-Soils

The road on which soils were tested after being treated to make them fit for road bases had several 50-ft. sections from which the top six inches of clayey soil had been taken up and mixed with lime or portland cement in varying quantities. The lowest treatment given was with 3% of hydrated lime and the highest with 9% of portland cement. Only the 9% of portland cement section was really satisfactory, with this particular clayey soil, but experiments in other parts, Iowa, for example, have shown excellent results from treatment with lime even in small percentages. But one wonders if it would not be equally good, and cheaper, to put down a few inches of clean sand or stone screenings, as some of the best road engineers in the country are recommending.

In the road where concrete slabs were tested for impact, various mixtures of concrete had been made into slabs. On each of these sections was an iron bar over which a loaded truck was driven so that its weight would drop about 3 in. after passing the bar. Impact tests are also being tried out by state laboratories as it is the effect of impact that has largely to do with the breakage of concrete road slabs.

Poor Aggregate May Cause Beam Failures

In one place on the grounds was a pile of concrete beams which had been broken to find the modulus of rupture. This test is more and more being used to determine the strength of concrete for highway slabs and it appears pretty certain that beams made of poor aggregate will break at a lower proportionate strength than in the compression test. Ordinarily, with good aggregate, the modulus of rupture has been found to lie between 20% and 22% of the compressive strength. This was determined by Prof. Abrams at the Lewis Institute laboratory. With poor aggregate such as dirty gravel or stone that is structurally weak it probably will be lower, although so far no experiments have been carried out to definitely determine this. Anyway it is gratifying to the regular producers of good clean aggregate to know that quality will show up better in the flexure test, for the whole strength of the aggregate industry lies in producing a quality product that will pass tests such as wayside pit material and the like can not hope to compete in.

An interesting little machine for testing coarse aggregate has just been developed by the bureau. It consists of a steel ball which drops in a cage. The stone or pebble to be tested is held on top of another ball at the bottom of the cage and broken by the fall of the ball above. The test is only comparative but it is a simple test and the device is one that can be used by inspectors and others in the field, so that in case of question as to the suitability of an aggregate a test can be made that will sufficiently determine the question.

Washington has a large building program before it. It is said that the government may spend $50,000,000 in the next five years on new and much needed buildings to house various departments and bureaus that are now inadequately housed.

A Swing Through the West

Activities in the Rock Products Industries at Davenport, Denver and Kansas City

By Charles A. Breskin

THE general impression gained from visiting producers in Iowa, Colorado and Missouri is that the demand for rock products materials will exceed that of last year. Specifications are becoming more rigid every day and the producers who are prepared to turn out cleaned and screened aggregate will have clear sailing.

The first stop was at Davenport, Iowa, where I visited the crushing plant of the Linwood Cement Co. This company is now pouring foundations for its new cement plant and, according to J. F. Schroeder, treasurer, it is hoped to begin operations around September or October. This plant will operate under the wet process and will have an annual capacity of 600,000 bbl.

Across the river at Rock Island, Ill., I saw the Rock Island Sand and Gravel Co.'s plant. This plant is one of the most modern in that district. The greater part of their output goes for road construction and the demand has become so heavy, that the plant is going to operate on a 24-hour per day basis. Proper lighting equipment for night operation has already been installed.

At Denver

From Davenport I went directly to Denver, Colo. This mountain city is undergoing a steady and consistent growth, and construction work of all kinds is going ahead at a good rate. It seems that the activity of the Fort Collins, Colo., oil field and the work on the Moffatt tunnel are having a big effect on Denver. A comprehensive street paving program is on now and this will take a good share of the production of the Denver sand and gravel plants.

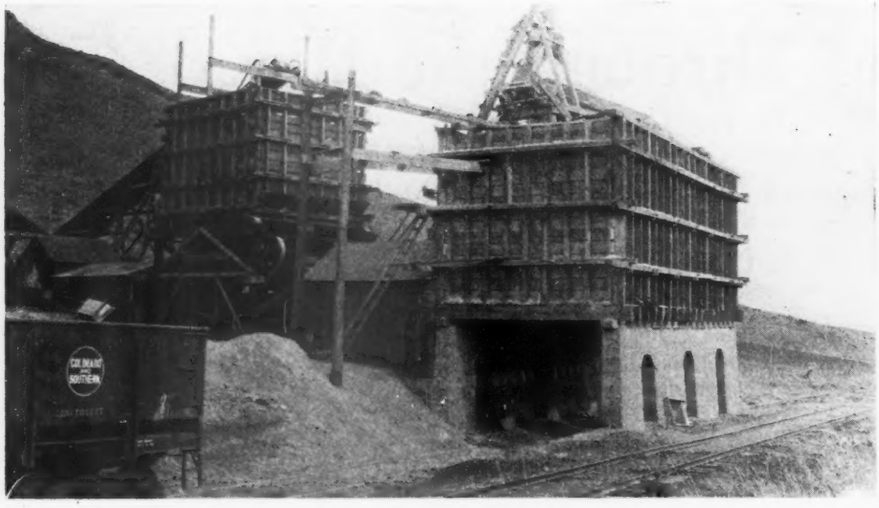
The Blue Diamond Co., is constructing a wet mortar lime plant in Denver and according to C. W. Spaulding, general manager, it will be in operation May 15, at the time of my visit the sand bunkers were being built. Mr. Spaulding was formerly sales manager of the Blue Diamond Materials Co. at Los Angeles, Calif. In addition to lime mortar, this company will handle sand and gravel, crushed stone, etc.

Denver is the home office of the Ideal Cement Co., which controls and operates seven portland cement plants in Colorado, Oklahoma, Utah, Montana and Nebraska. Paul C. Van Zandt, chief engineer of the company, is a man who has been in the cement industry since 1899. He has operated cement plants all over the world, spending seven years as chief engineer for the Asano Cement Co., in Japan. My first question to him was, "Are you building the new plant at Fort Collins dry process because sufficient water is not available?" Mr. Van Zandt answered that he did not wish to enter into

Tramway of Golden Basalt Products Co., Golden, Colo.

Crushing plant of the Golden Basalt Products Co.

Screening and crushing plant with trestle and tramway to quarry at the right



Screening plant and bins of Golden Basalt Products Co.

a controversy but it was his firm conviction that all things being equal, a dry plant was more economical than a wet and could produce just as good a cement.

Why Ideal Plant Is to Be Dry Process

According to Mr. Van Zandt, it is a distinct economic disadvantage to build a wet plant unless there is some special reason for its use. When countered with the question as to why nearly all of the recent plants were wet, Mr. Van Zandt replied that it was merely the style now and when a trend runs in a certain direction it's hard to change. Nearly all comparisons of wet and dry plants have been a new wet plant as against an old dry one and it is natural that the dry plant should show to disadvantage. Mr. Van Zandt operates a wet plant at Ada, Okla., and at this place is an old dry plant. Despite the use of antiquated machinery in the old dry plant, it is producing cement almost as cheaply as the much more modern wet operation.

Mr. Van Zandt maintains that chemical control can be just as positive in a dry plant as in a wet, and in addition, repair costs are lower and less fuel for burning is required in dry plants. Every statement of his was backed up by figures that he has accumulated during his experience in the cement industry.

Ground has been broken at Fort Collins, Colo., where the million barrel Ideal company plant will be erected. At the Portland, Colo., plant designs have been made for complete rehabiliation of the grinding plant. Four No. 826 compeb mills will replace 16 old grinding mills. Mr. Van Zandt says when completed this plant will be the most modern dry plant in the country. Considerable other work is being done at the company's other mills.

New Rock-Crushing Plant

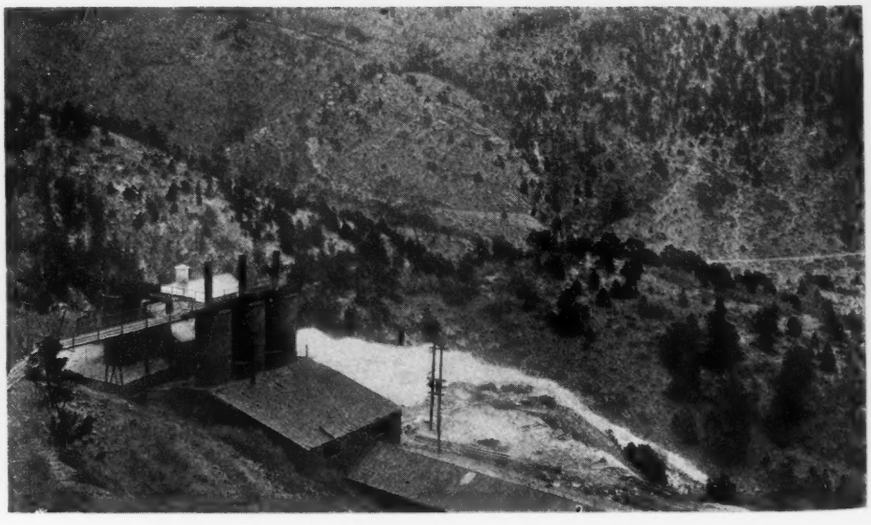
A new crushing plant is being built at Golden, Colo. This plant, known as the Golden Basalt Products Co., is operated by James Lawrence, who for thirty years was assistant city engineer of Denver. Since 1918 he has been in the general contracting business and late in 1924 he started to build this stone plant. His original purpose was to build only a small plant in order to get stone for his own work, but he saw a real need for a good aggregate in Denver and so now the production of crushed stone is his chief business.

The plant is located on what is known as North Table Mountain, in the foothills of the Rocky Mountains, and only 15 miles from the heart of Denver.

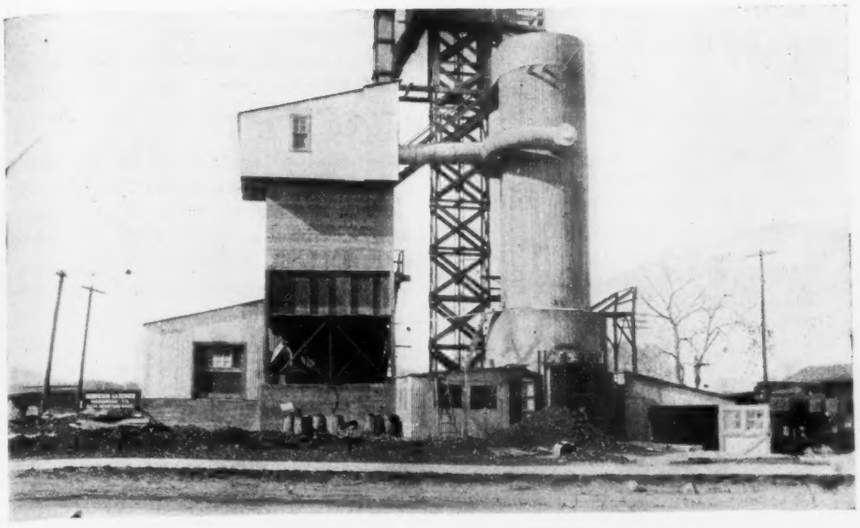
The rock is quarried by the "gloryhole" method. It is extremely hard rock, being of a volcanic origin and makes an excellent concrete aggregate. It should find an excellent market in Denver inasmuch as there is

The city of Manitou from the Western Lime Co. plant

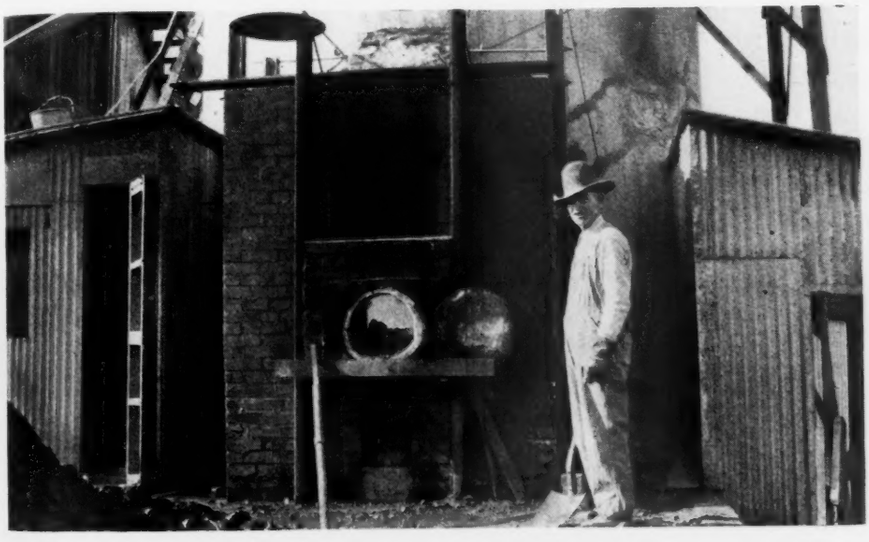
Quarry of the Western Lime Co. of Denver



Lime plant of the Western Lime Co. in the mountains near Manitou



Lime plant of the Pueblo Lime Co., Pueblo, Colo.



Furnace door of Pueblo Lime Co. special kiln

Lime-drawing doors of Pueblo Lime Co. kiln

a shortage of gravel there. The top of the mountain from which the rock is obtained is 711 ft. above the level of the crushing plant and the tramway from the deposit to the initial crusher is 1475 ft. long, with a 38% grade. The method of operation is unique in a good many respects. A complete description of this plant will be published in Rock Products shortly.

New Lime Plants

At Manitou, Colo., a famous summer resort, near Pikes Peak, I visited the plant of the Western Lime Co. This company produces a high calcium lump lime and hydrated lime marketed under the trade name "Pikes Peak Brand." The plant consists of four shaft kilns fired by semi-gas producers. Lime is drawn on a concrete floor and sorted. The fines are conveyed to a Williams hammer mill, stored and then go to a Clyde hydrator. The lump lime is packed in barrels or loaded into cars for bulk shipments. The discharge from the hydrator goes to a Raymond mill and thence to a Bates valve-bag packer. The plant has a capacity of 25 tons of burned lime per day. W. O. Schlotz is president of the company and A. E. Alkire, secretary and treasurer.

At Pueblo, Colo., I came across an unusual lime kiln installation. It was just recently built by the Pueblo Lime Co. The kiln is constructed entirely of concrete, being 8 ft. inside diameter, 10 ft. 6 in. outside and 45 ft. in height. Stone is obtained from Salida, Colo., in gondola cars and unloaded at the plant. It is delivered by wheelbarrows to a skip hoist which discharges at the top of the kiln.

The kiln has a forced draft at the bottom and induced draft at the top. Lime is drawn every six hours through gates located on either side of the kiln and apparently on the same level as the fire boxes, of which there are two, one on either side of the kiln. According to the operator present, the capacity of the kiln is eight tons per 24 hours with a fuel ratio of 4 to 1.

At the time of my visit a hydrate plant was being built and it is planned to build another kiln shortly.

Kansas City Developments

At Kansas City, Mo., I was told on good authority that the Missouri Portland Cement Co. was to erect a 1500-ton stone crushing plant near the site of their cement plant at Cement City. They contemplate getting into the Kansas City market. They will mine the stone on a large scale.

Business in the Kansas City district is unusually good. The $5,000,000 Sears-Roebuck building and the $11,000,000 waterworks project will call for considerable cement and aggregate.

R. Newton McDowell, president of the Consolidated Crushed Stone Co. with plants at Gallatin and Smithville, Mo., is changing from a quarrying to mining operation. By doing so he gets at once to the Bethany

Falls ledge of stone, the only suitable stone in the state for aggregate, he says. In addition, the operations are to be on such a large scale that it is actually cheaper to mine than quarry and move the troublesome overburden and shale seams.

At Gallatin, Mo., the tunnel method of mining is used, while at Smithville a 6x15 ft. shaft is being sunk. The shaft is to be sunk to a depth of 222 ft. and will strike a 24-ft. ledge of stone. At the time of my visit, April 18, the shaft had already gone down 135 ft. and it is expected to be in operation within 30 days.

The Blackwater Stone Co., Blackwater, Mo., another of Mr. McDowell's plants, will be completed by June 1. This will be a 2000-ton per day plant and the rock will be quarried. The quarry will have a 60- face of stone with only 4 ft. of overburden.

Prize Award for Testing Laboratory Design for Cement Plant

A PRIZE of $100 will be awarded by May 15 to the contestant who submitted the best group of ideas embodied in the layout and arrangement of floor plan and equipment for a new laboratory building for the Great Western Portland Cement Co., Mildred, Kan.

Points to be considered:

1. To provide ample and convenient space and facilities for the regular testing work at a 1,000,000 bbl. portland cement mill.
2. To provide ample space and facilities for additional scientific research looking towards the further improvement of Victor cement.
3. To provide ample and convenient space and facilities for the accommodation of chemists, testers and inspectors representing our customers.
4. The layout and arrangement should be so designed as to promote economy in testing through proper lighting and elimination of waste effort; to inspire industry, neatness and cleanliness.
5. It is the intention to provide the most modern and practical apparatus and equipment developed for cement mill testing conditions. The ideas and sketches submitted should show the selection, arrangement and details of this apparatus and equipment with sufficient clarity to permit the complete development of the author's ideas.
6. The layout and arrangement should be so designed as to give due consideration to economy in cost of construction.

Rules governing contests were:

1. The prize ($100) will be awarded for the material submitted embodying the greatest number of acceptable ideas.
2. Ideas may be submitted in any convenient form (written description, sketches—pen or pencil—rough or finished, photographs, etc.).
3. Material submitted must not bear contestant's name. The name must be submitted in a sealed envelope enclosed with the material. Envelopes and material will be numbered as received and sealed envelopes opened only after the judges have made the award.
4. This contest was open to any one interested except the judges.
5. The material and ideas awarded the prize are to become the property of the Great Western Portland Cement Co.
6. If so requested, material not used will be returned to the sender.
7. All material for this contest must be submitted to "Laboratory Contest," The Great Western Portland Cement Co., 410 Land Bank Bldg., Kansas City, Mo., and had to be received before May 1, 1925.
8. Judges are: F. V. Reagel, engineer of materials, Missouri State Highway Commission, Jefferson City, Mo.; C. H. Scholer, state testing engineer, Kansas State Agriculture College, Manhattan, Kan.; H. H. Blaise, superintendent; Robert S. Schultz, Jr., consulting engineer, The Great Western Portland Cement Co., 410 Land Bank Bldg., Kansas City, Mo.
9. Award will be made as soon as possible after May 1 and not later than May 15, 1925. The award will be given publicity in cement journals.

Death of Lewis J. Bennett

LEWIS J. BENNETT, president of the Buffalo Cement Co., Ltd., died at the age of 91 at his home at 354 Depew Avenue, Buffalo, N. Y., on April 15.

Mr. Bennett was born in the town of Duanesburg, Schenectady County, N. Y., and received his school education at Fort Plain. In 1877 he organized the Buffalo

Lewis J. Bennett

Cement Co., Ltd., which was one of the pioneer natural cement manufacturing companies of the United States. Later the company left the cement business and entered the crushed stone industry and it still operates a crushing plant and quarry at Buffalo.

Besides his activities in the rock products industry, Mr. Bennett had much real estate, the development of which has made him a very prominent man in Buffalo history.

$136,000,000 Appropriated for Building Roads in Illinois

SIX bills, including three which appropriate a total of $136,000,000 for hard road construction, have been signed by Governor Small.

Three senate bills, all sponsored by Senator Meents, will provide $96,000,000 for paving work from the recent $100,000,000 bond issue, $5,000,000 for acquisition of land containing road building materials and $35,000,000 from the $60,000,000 bond issue.—*Chicago Tribune.*

Bill No. 63 reappropriates $96,000,000 from the State Road Fund of the Department of Public Roads or as much as is necessary for the construction of hard-surfaced roads this year along designated routes as originally approved June 29, 1923.

Bill No. 64 provides for the appropriation of $5,000,000 during the biennium commencing July 1, 1925, for carrying out provisions of an act, approved June 28, 1921, authorizing the Department of Public Roads to acquire property containing road building materials and to erect and operate plants to produce the material.

Bill No. 65 appropriates $6,000,000 for the maintenance of state highways. This bill was made necessary because the state had taken over more highways than original maintenance appropriations provided for.

Bill No. 66 provides for the appropriation of $35,000,000 from the Road Fund of the Department of Public Roads for the period beginning July 1, 1925, and ending June 30, 1927, for construction of hard-surface roads along routes described in acts approved June 22, 1917, and June 29, 1923.

Installing Hydrating Unit in Vermont Lime Plant

THE Swanton Lime Works, Swanton, Vt., are installing a hydrating plant of entirely new design, according to a statement by John P. Rich, proprietor.

This plant now operates five Bradley gas-fired kilns and produces a high calcium lime mostly for chemical use. The new hydrator is designed to give a high screen test product from their lime without any grinding.

Signal Mountain Cement Declares Dividend, Improvements Discussed

A DIVIDEND was declared at the quarterly meeting of the board of directors of the Signal Mountain Portland Cement Co., held recently at the company's offices in the James Bldg., Chattanooga, Tenn. Payment of the balance of the accumulated dividends on the preferred stock to January 1, 1925, was authorized to stockholders of record as of April 15.

This is a completion of all accrued dividends in the first year of operation.

Attending the meeting were all officers and directors of the organization, including John L. Senior, president, and the following directors: F. P. Butler, Chicago; W. A. Sadd, J. L. Caldwell, J. P. Hoskins, H. J. Weeks and L. L. Fischer of Chattanooga; F. A. Carter, Sweetwater; C. L. Hardwick, Cleveland; E. J. Trimby, Glenns Falls, N. Y., and R. G. Wright, Knoxville.

Among other items of business the directors discussed a proposition to install a waste heat boiler plant in connection with the kilns and the building of a power house to generate electric power for the entire plant and quarry operation.

The visiting directors inspected the plant on the Tennessee river at the base of Signal mountain. A new all-concrete office building is now under construction at the plant. This office building is fireproof throughout, is being built at a cost of about $20,000 and will probably be finished in July.

Stock books of the company will be closed from May 5 to 15, in accordance with the by-laws of the corporation.—*Chattanooga (Tenn.) Times.*

Ohio Macadam Association Holds Annual Meeting

Going to Try to Get Better Workmanship on Macadam Roads

THE greater part of the annual meeting of the Ohio Macadam Association at Columbus on April 23 was devoted to discussions of the highway situation in that state and what crushed-stone producers, individually and collectively, can do to get a higher grade of workmanship from contractors. Maintenance Engineer Perry, of the Ohio State Highway Department, told the members in so many words that the future of macadam roads depended on their being correctly and honestly built—that they were less fool-proof in building than competitive types of road—and he earnestly asked every effort be made to get better workmanship.

Opinion seemed to vary as to how far a stone producer is responsible for the correct use of his material after he has met the specification requirements, but at the business meeting on the second day an agreement was reached for all macadam interests, including tar and asphalt, to stand together for the best possible construction of this type of pavement. Collectively and individually the members of the Ohio Macadam Association will try to use their influence for better stone sizing, more rolling, better drainage, etc.

The highway situation in Ohio at the present time is more or less in doubt, for the governor and the state highway engineer are "at outs" and the highway engineer's term does not expire until August. The state legislature has recently passed a 2-cent per gallon gasoline tax over the governor's veto, but the constitutionality of the law remains to be passed on. When this is settled Ohio will have more money for highway work than at any time in history.

All the old officers and the executive committee were re-elected. The officers are: E. E. Evans, Whitehouse Stone Co., Toledo, president; Harry H. Brandon, Ohio Marble Co., Piqua, first vice-president; G. H. Faist, Woodville Lime Products Co., Woodville, second vice-president; W. J. Keever, Marble Cliff Quarries Co., Columbus, treasurer; A. P. Sandles, Columbus, secretary. The executive committee is as follows: E. E. Evans; H. M. Sharp, France Stone Co., Toledo; Harry H. Brandon; W. J. Keever, O. A. Brand, the Barrett Co., Cleveland.

W. J. Keever, Marble Cliffs Quarries Co., Treasurer

E. E. Evans, Whitehouse Stone Co., Toledo, President

A. P. Sandles, Secretary, Ohio Macadam Association

Harry H. Brandon, Ohio Marble Co., Vice-President

Minnesota Commission Cannot Recommend State Plant

"THE Minnesota Cement Commission is not in a position to recommend that the state should go into the business of manufacturing cement, on the basis of information that it has in its possession."

This is the gist of the report, according to the *St. Paul (Minn.) Pioneer-Press*, of the majority of the interim committee named at the last session of the legislature to report at the present session.

The committee investigated various limestone and marl deposits in the state and visited a few cement plants, including South Dakota's state plant at Rapid City. The committee makes no recommendations but advises that expert engineers be employed to study the economic features of the project.

Financial News and Comment

Wabash Portland Cement Bond Offering

THE First National Co. and Watling, Lercher & Co., Detroit, are offering at prices to yield from 5¼% to 6%, according to maturity, $1,000,000 6% Serial Gold Notes.

Dated March 16, 1925; due serially March 15, 1927 to 1932. Denominations $1,000 and $500. Reading all or part, on any interest date up to and including September 15, 1930, at 101 and thereafter at 100½. Principal and interest (M. & S.) payable without deduction for Federal income tax up to 2% at the office of Union Trust Co., Detroit, trustee. Following is statement furnished by the company:

Company.—Incorporated in Indiana in 1899, with authorized capital stock of $600,000. In 1922 the stock was increased to $1,500,000, of which $894,650 was outstanding as of December 31, 1924. The plants at Stroh and Steubenville, Ind., are advantageously located for distribution in the States of Indiana, Ohio, Illinois and Michigan. Recently the company acquired approximately 775 acres of limestone land in the vicinity of Osborn, Ohio, which purchase insures ample supplies of raw material, and because of favorable freight rates will permit further distribution of the company's product in the markets of Southern Ohio. A plant of the most modern and approved design is under construction at Osborn, which it is contemplated will be placed in operation in the fall of 1925.

Earnings and Working Capital.—Company's net earnings before Federal income taxes for the year ended December 31, 1924, were $378,701, or in excess of six times the maximum interest charges of these notes. Such net earnings for the past five years have averaged $234,027, which is equivalent to approximately four times these interest requirements. These earnings do not reflect any operations at the Osborn, Ohio, plant. Company's balance sheet as at December 31, 1924, disclosed working capital of over $800,000.

Purpose.—Proceeds will be used by the company to defray in part the expense of building and equipping its plant at Osborn, Ohio, the cost of the land and the balance of the expense of the new improvements being available from accumulated earnings of the company.

Connecticut Quarries Co. Bonds

THE recent sale and reorganization of the Connecticut Quarries Co., New Haven, Conn. (see ROCK PRODUCTS, January 10, p. 61), involved a refinancing and the issue of $350,000 in first mortgage 7% convertible gold bonds, dated January 1, 1925, due January 1, 1940. The whole capitalization on completion of this financing will be: $1,050,000, of which $350,000 is first mortgage 7% convertible gold bonds, $200,000 in 7% debentures, due January 1, 1940, and $500,000 in common stock of $100 par value.

The bonds are secured by a first mortgage on the real estate and equipment of five quarries and the leasehold and equipment of one quarry, all located in Connecticut. These quarries have an annual output of about 700,000 tons of trap rock. The bonds are convertible into common stock in the ratio of 10 shares of stock per $1000 bond. The mortgage provides for a sinking fund of $25,000 a year. The average net earnings for these quarries, according to Theodore R. Blakeslee, president, for the past six years has averaged $68,526, or 2.75 times the interest on this issue of bonds. The net earnings for these quarries for the calendar year 1924 were $140,000, or 5.7 times the interest on this issue of bonds.

The following is a balance sheet as of January 3, 1925, as prepared by the T. M. Byxbee Company, public accountants, after giving effect to the present financing:

ASSETS	
Current Assets	$ 47,292.53
Plant and Machinery	881,253.45
Steam shovels, locomotives, cars	75,000.00
Tools and Parts	14,000.00
Leases	29,000.00
Miscellaneous	5,454.02
Deferred Assets	28,000.00
Total Assets	$1,080,000.00

LIABILITIES	
Current Liabilities	none
First Mortgage 7s due Jan. 1, 1940	$ 350,000.00
7% Debenture Bonds, due Jan. 1, 1940	200,000.00
Common Stock, 5000 shares, Par $100	500,000.00
Surplus	30,000.00
Total Liabilities	$1,080,000.00

RECENT QUOTATIONS ON STOCK IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co.	Apr. 27	100	100	110	
Arundel Corporation (sand and gravel—new stock)	Apr. 24	No par	23¼	23½	
Arundel Corporation	Feb. 11	50	112	113½	
Atlas Portland Cement Co.	Apr. 27	100	131	136	
Atlas Portland Cement Co. (preferred)	Apr. 3	100	120	.....	
Boston Sand & Gravel Co.	Mar. 27	100	63½	63½	
Canada Cement Co., Ltd.	Apr. 29	100	103½	104	1½% quar. Apr. 16
Canada Cement Co. Ltd. (preferred)	Apr. 3	100	.....	115	1¾% quar. May 16
Charles Warner Co. (lime, crushed stone, sand and gravel)	Apr. 26	No par	21½	24	50c Apr. 10
Charles Warner Co. (preferred)	Apr. 26	100	100	102	1¾% Apr. 23
Giant Portland Cement Co.	Apr. 28	50	31	31	
Giant Portland Cement Co. (preferred)	Apr. 24	50	50½	51½	
Ideal Cement Co.	Apr. 27	No par	58	59	75c Mar. 31
Ideal Cement Co. (preferred)	Apr. 27	100	108	109.5	1¾% quar. Mar. 31
International Cement Co. (common)	Apr. 29	No par	61¾	62¾	$1 Mar. 31
International Cement Co. (preferred)	Apr. 13	100	103.5	105.0	1¾% quar. Mar. 31
International Portland Cement Co. (preferred)	Mar. 1	.....	30	45	
Kelley Island Lime & Transport Co.	Apr. 29	100	102	104	2% quar.
Lehigh Portland Cement Co.	Feb. 13	.....	67	69	1½% quar. Apr. 1
Michigan Limestone and Chemical Co. (preferred)	Apr. 11	100	.....	.....	1¾% quar. Apr. 15
Missouri Portland Cement Co.	Apr. 29	25	49	49	50c May 1
Pacific Portland Cement Co., Consolidated	Apr. 25	.....	83	.....	
Peerless Portland Cement Co.*	Apr. 28	.....	8¼	9	
Petoskey Portland Cement Co.*	Apr. 28	.....	9⅛	10	
Pittsfield Lime and Stone Co. (preferred)	.....	100	.....	.....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred)	Apr. 27	100	98	.....	3½% semi-annual
Rockland and Rockport Lime Corp. (2nd preferred)	Apr. 27	100	67	.....	3% semi-annual
Rockland and Rockport Lime Corp. (common)	Apr. 27	No par	57	.....	1½% quar. May 1
Sandusky Cement Co. (common)	Apr. 29	100	88	92⅞	2% quar. Apr. 1, 100% payable in com. stock, Apr. 1
Santa Cruz Portland Cement Co. (bonds)	Apr. 25	100	103¼	.....	6% annual
Santa Cruz Portland Cement Co. (common)	Apr. 25	50	.....	60	$1 Apr. 1
Superior Portland Cement Co.	Mar. 1	100	.....	120	
United States Gypsum Co. (common)	Apr. 29	No par	152	154⅞	40c quar. Mar. 30
United States Gypsum Co. (preferred)	Apr. 11	100	114	116	1¾% quar. Mar. 30
Wabash Portland Cement Co.*	Apr. 28	.....	50	75	
Wolverine Cement Co.	Apr. 29	10	11¾	12⅜	2% May 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich.

Editorial Comment

Plaster Sands

Every sand and gravel producer should note with interest the growing appreciation of a more extensive knowledge of plaster sands. We are all used to investigations and specifications for concrete sand, but hitherto almost any old sand was considered good enough for plaster. In fact, our aristocratic journeymen plasterers rather preferred a dirty sand because it makes a plaster easier to get on the wall, even though its lasting qualities were not all they should be. We imagine that at least half the plaster sands now used come out of the cellar excavation or some nearby hand-shovel pit. In the aggregate, when proper sands are specified and used the business of commercial producers will show an appreciable increase. The article in this issue by George O. Gray and that in our March 21 issue by H. V. Johnson should prove indispensable.

Producers Studying Aggregate

Last January a well known railroad engineer told the members of the National Sand and Gravel Association that they knew very little about the application of their product, and there was enough truth in the statement so that it had a sting. But this is a condition that is fast being changed. Many producers of aggregate are no longer relying on what the state highway and government laboratories say about their product, they are carrying out tests in their own or in commercial laboratories. One of the largest sand and gravel companies has carried out a great many tests and is to install a fully equipped testing laboratory. Another company, by doing its own testing, succeeded in making an excellent concrete aggregate out of material that appeared hopeless, and this was in a locality where such aggregate was badly needed.

Recently a company which is a large producer of crushed slag has employed a consulting engineer of national reputation to study the uses of its product, especially as fine aggregate. Objection has been made to the use of "slag sand" on the ground that the concrete made with it did not have the necessary plasticity, but he has discovered that by careful attention to the grading a slag sand can be produced that will give the necessary workability without the use of extra cement or an admixture.

Aggregates for cement products are now being closely studied by far-seeing producers of crushed stone, slag and sand and gravel. Special aggregates are now being made and sold with a guarantee of a certain number of cement blocks of the required strength to the sack of cement. The time to say that aggregate producers are not thoroughly acquainted with their product is fast passing, we are thankful to say.

Responsibility for Workmanship

A thorough knowledge of one's merchantable products necessarily includes a knowledge of their uses, and an understanding of whether or not the most advantage is taken of the products' special properties, or the most intelligence used in overcoming their defects. Therefore the responsibilities of a producer, even of a basic commodity like crushed stone, do not end when he has made a material that satisfies the specifications. We mean his responsibilities to his industry and the future of his own business enterprise.

Certainly, there is no legal or moral responsibility on the part of the producer to see that the material he produces is properly used to give the best results in the product somebody else makes. Certainly, the producer of crushed stone has no direct responsibility, and it may look at first glance, no direct concern, as to how his material is used in the construction of a road. To be sure, if the road is rotten he can readily say it is the engineer's or the contractor's fault; the *materials* were all right, but the *workmanship* was faulty.

The man who uses the road doesn't care a d—n whose fault it was. He knows the road is rotten and he associates this with the type of pavement he observes it to be built of. The crushed stone producer is selling the public, the public puts up the money to pay for his stone; but he is not selling the public crushed stone, he is selling the public a road. So, however, you may figure the limit of your legal and moral responsibilities when you have fulfilled specifications, ordinary good business sense shows you must use every endeavor to see that what the public buys is the best it can buy for the money expended. In the words of the late President Cleveland, we are here facing facts and not theories.

That doesn't mean that every crushed stone producer is going to fight with the contractors who use his stone to secure good workmanship. Obviously that is absurd. It does mean that crushed stone producers, or slag producers, or gravel producers, as the case may be, must *collectively* know more about the correct use of their products than anybody else, and they must eventually through education, and persistent educational efforts, teach other people how to succeed in the use of these commodities. Needless to add portland cement manufacturers have lighted the way; and we venture to say without the educational work done in the *use* of cement, the mineral aggregate industry as well as the cement industry would still be where it was a dozen years ago—and education in the use of cement certainly means education in workmanship, if it means anything at all.

Building New Lime Plant at Lindsay, California

DEVELOPMENT work has started on the high calcium limestone deposit in the hills east of Lindsay, Calif., by the Albramson and Bode Corporation. Six acres of land have been purchased at the end of the Visalia Electric railroad spur track in El Mirador. Material is on hand for the erection of a plant. Frank E. Wilson of Los Angeles is in charge of operations.

The lime plant is expected to cost $200,000 and will employ 50 men.—*Fresno (Calif.) Republican.*

Cement and Concrete Industries to Be Represented at Paris Exposition

A NUMBER of the cement and concrete industries intimately connected with the International Exposition of Modern Decorative and Industrial Art, which opens in Paris, in May, will be represented by delegates who will accompany the commission appointed by Secretary Herbert Hoover of the Department of Commerce.

The increasing interest of American industries in the art movement which is finding expression in the great International Exposition has attracted many delegates who will join in a survey and study of the specialized exhibits to which the exposition is restricted.

The exposition will occupy the Esplanade des Invalides, the Alexandre III Bridge and the Gardens of the Cours la Reine, the entire Grand Palais and the quays of the Seine, from the Concorde to the Alma bridge. Practically every foreign country will exhibit its artistic products.

In officially recognizing the importance of this exposition, Secretary Hoover has taken the first step in the government interest in industrial arts. He called upon the commission to report on such features of the exposition and phases of the individual groups of exhibits as may be of interest and value to American manufacturers. Additional information may be obtained from the U. S. Department of Commerce.

E. C. Swessinger Named Sales Manager for Kelley Island Company

E. C. SWESSINGER, formerly representative for the Kelley Island Lime and Transport Co., of Cleveland, Ohio, in western Ohio, later western manager at Hunt-

E. C. Swessinger, new sales manager of the Kelley Island Lime and Transport Co.

ington, Ind., and more recently eastern manager at New York, has been appointed general sales manager of the company at Cleveland, Ohio.

"Innocents Abroad"

THE accompanying views, kindly loaned by *Building Supply News,* show a well-known lime manufacturer in unfamiliar setting.

Mr. and Mrs. J. J. Urschell (Mr. Urschell is president of the Woodville Lime Products Co., Woodville, Ohio) left New York City on the *S. S. Scythia,* February 29, intending to visit nearly all points of interest on the Mediterranean, returning by way of Italy, France and England. Madeira, Lisbon, Gibraltar, Algiers, Constantinople and Cairo are among the places being visited. Combined with his sightseeing plans, Mr. Urschell is visiting lime plants that offer anything of particular interest.

New Oklahoma Cement Company Elects Officers

AT a meeting of the incorporators of the Mid-Continent Portland Cement Co., recently incorporated under the laws of Delaware to erect a portland cement plant at Tulsa, Okla., as noted in the April 18 issue of ROCK PRODUCTS, officers and directors were elected. A. L. Farmer was chosen president, C. H. Terwilleger and Arthur Craver, vice-presidents, and A. E. Bradshaw, treasurer. Directors elected in addition to the officers were T. J. Hartman, O. K. Eyesenbach, H. L. Standeven, C. A. Mayo, I. F. Crow, Cyrus H. Sweet and R. Otis McClintock.

The offices of the company are now located in the Atlas Life building at Tulsa, Okla.

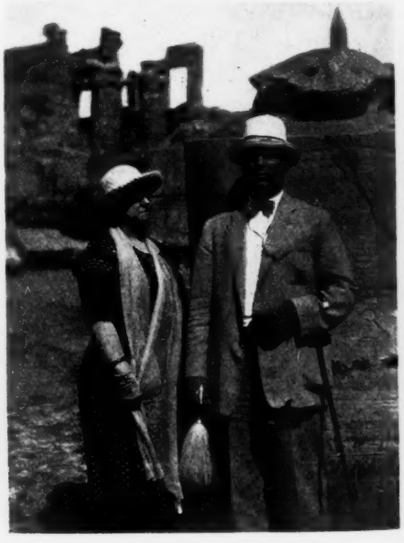
Lewiston Portland Cement Company to Operate Idaho Lime Plant

ANNOUNCEMENT has been made that the Lewiston Portland Cement Co. will operate the Crystaline Lime Co.'s properties at Orofino, Idaho, and that operations will be commenced as soon as the plant and equipment can be overhauled.

It is stated extensive improvements are needed at the plant to reduce operating expense and place the several products on the market at a profit and the new company proposes to make these improvements as soon as its engineer returns from an eastern trip to make the necessary inspection—*Lewiston (Idaho) Tribune.*

The Lewiston Portland Cement Co. is now in the process of being financed by business interests in Spokane, Wash.

J. J. Urschell at the Theatre of Dionysius at Athens, Greece. He is standing next to the famous sculpture of "Father Time." This photo was awarded first prize on the cruise



Mr. and Mrs. J. J. Urschell at Sacred Lake, Karnak, Luxor, Egypt. The above photograph shows the Sacred Scarab in the background

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

The Work of John J. Earley

ALL the world—at least all of the world that is interested in concrete or in architecture—knows of John J. Earley of Washington, D. C. The interior of Sacred Heart Church, near Washington, and the Fountain of Time in Chicago, are perhaps as well known as any works of art created in the twentieth century. For Mr. Earley is almost the inventor of a new thing, the use of concrete as a medium of artistic expression.

"You cannot *translate* into concrete; you must learn to think freely in it." That was one sentence which Mr. Earley used in explaining his work to the editor of ROCK PRODUCTS. And it seems to explain everything. Concrete is not to be used as an imitation of granite or marble or anything else. It is not to imitate the marks of the stone cutters' chisel or be molded with the hands like clay. It is to be cast and the work must be done with a thorough knowledge of the limitations as well as the possibilities of concrete.

George Hutchinson, who is well known as a concrete engineer, once told the writer that Mr. Earley knows more about aggregate than anybody else, even those who had studied it for years in the laboratory. When Mr. Earley was told this he merely remarked that differences in grading and in the percentage of voids that would hardly be noticed in a laboratory test would show up very noticeably on the wall. This is illuminating as showing the care and thought that must go into his work.

"A grain of aggregate is a spot of color," said Mr. Earley. This was the beginning of knowledge as regards the use of concrete in his work. But it took ten years of study and experiment before he could combine those spots of color to get the effect he wanted. Much of this study was given to paintings in the art galleries of the country, noting how painters used certain colors in juxtaposition to get an effect that could not have been secured by blending and mixing pigments. He said that the work of certain

Studio of John J. Earley, "Concrete Specialist," Washington, D. C.

Close-up showing some of the decorative possibilities of concrete

French artists in hard pastel had been very helpful. These artists crossed-hatched one set of color lines over another so that a series of color spots were left. These spots at a certain distance resolved themselves into a tint or gradation of color, and this was the effect that was wanted. In using aggregates for facing concrete work the same laws applied, that is the "spots of color" resolved themselves into the tint or shade that was wanted, at a certain distance from the eye.

The writer spoke of the beautiful effect of some walls of concrete block that he had seen, especially those made of limestone screenings. Mr. Earley hesitated a moment before commenting and finally remarked that it was a pity that such effects were accidental when study and practice would enable the makers to produce more beautiful faced block and stucco and to predetermine the effect they would have in the wall.

To anyone who thinks of concrete as a dull cold surface it is astonishing to see how much warmth and color may be put into it by a man who understands it. The front of Mr. Earley's house and studio shown in the picture is an example. It is of a beautiful soft brownish tint, the softness coming from the carefully selected aggregate, selected both as to size and color, that has gone into the stucco. The shield over the door of the studio is a brilliant red and blue, much brighter in color than one would think could be made in concrete. The day of cement products is just dawning.

Concrete Masonry Chosen for Ideal Firesafe Home

Structure Erected by the "Topeka Daily Capital" Demonstrates One Good Way to Get Publicity for Cement Products

THE steps of the state capitol at Topeka, Kansas, were recently the spectators' gallery for an attempt to destroy by fire a modest little house designed to demonstrate modern building principles. The stage was all set in a manner that would have delighted the eye of old Nero, Rome's "fiddling firebug." State and city officials attended. The little house was filled with wood and tar, inflammable materials such as unthinking men sometimes use in building homes for dear ones they profess to care for.

State Fire Marshal Scott applied the torch. For an hour the interior was a raging furnace. The heat soon passed the melting point of bronze and iron. The walls became white-hot within—while the outside could be touched with the bare hand. Water streams applied when the walls were hottest failed to injure them. Careful investigation showed the walls and the cinder concrete block of which they were made to have been left in perfect condition.

The concrete block for the little fire demonstration building were a part of the supply intended for the "Ideal Firesafe Home," then being erected by the *Topeka Daily Capital* with the co-operation of a group of the leading business men of Topeka. About 100 members of the state insurance agents association witnessed the fire. The Kansas Inspection Bureau promptly and unqualifiedly gave the "Ideal Home" the lowest fire rate possible for concrete masonry houses of any type.

Senator Arthur Capper of Kansas turned the first spadeful of earth for the house. The Crowell Fireproof Block Co. of Kansas City, which is building a large cement products factory in Topeka, furnished cinder cement block for the walls through Hargraves & Co., local building supply dealers. All of the other materials were also of recognized high quality, supplied by manufacturers or dealers who also supported the *Capital* with generous advertising patronage. So well was the project received by the local building industry that advertis-

Demonstration of the fire-resisting properties of cement-cinder block in front of the state capitol, Topeka, Kans.

U. S. Senator Capper breaks ground for the Topeka "Daily Capital" house

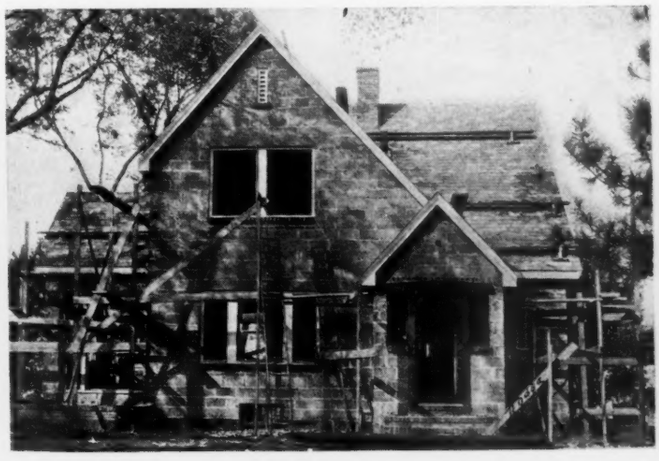
ing in the special home department of the newspaper increased by an amount greater than the total cost of the house. Much of this advertising came from concerns which had advertised very little if at all up to this time.

Charles D. Cuthbert, a well known architect of Topeka, designed and supervised the construction of the building, which he gave his personal attention. An adaption of the English cottage type was decided upon and on completion proved unusually well fitted for local surroundings and demands.

In his designs Mr. Cuthbert followed typical concrete masonry construction details quite closely, taking advantage of the many unique advantages possible with concrete—the superior rigidity, the dignified deep reveals of the windows, and artistic old English period stucco. The stucco was given a light buff tint to add warmth and the desired textural finish was secured by the use of a sponge, dashed lightly afterward.

In December, before the house was ready for formal inspection, there was an excellent opportunity to test out its wall insulation qualities. The last four days of the cold snap at that time experienced temperatures below zero. Not only was it possible to hold the temperature of the house constant at 85 deg., without show of condensation anywhere on the walls, but this was accomplished *with the oil burner running an average of only ten minutes to the hour.* One night the thermostat was set at 60 deg., and *it did not operate until 8:30 a. m.,* requiring about nine hours for the temperature to drop to 60 deg.

More than 2000 of Topeka's citizens witnessed the fire demonstration. Seventy local and national concerns participated in the publicity campaign of which the house was the centerpiece, advertising materials used or services rendered in construction. Advertising while the building was being built totaled nearly 10,000 column inches. Important state and city officials visited both fire demonstration and "Ideal Home." Thousands of persons who inspected the home during the "open house" period during December, requested definite information about the use of concrete masonry for homes for themselves. In two weeks over 8000 persons were shown through. Many thousands of cement block have been sold as a direct result. Columns and pages of constructed newspaper publicity were printed by the editors of the *Topeka Daily Capital* and the people of the vicinity aroused to an appreciation of good construction as never before.



The "Ideal Home" under construction

The "Ideal Home" ready to move into

Artificial Travertin Stone

SOME readers will remember that travertin stone was used in the construction of the Pennsylvania Railroad station in New York City, which was completed in 1913. Fewer readers will remember that Paul E. Dennivelle was retained as subcontractor by the Fuller Construction Company to install imitation travertin, which is the material covering portions of the interior of the station. The Dennivelle contract was executed March 5, 1909 and on November 29, 1910, the Dennivelle Company executed an acknowledgment that it had received from the contractor the sum of $125,741.03 in full payment of all moneys due or to become due in connection with the contract. On October 20, 1915, Dennivelle applied for a patent on this artificial travertin, and the patent was issued to him in 1917. A suit was brought some time ago by Dennivelle against McGruer and Simpson, contractors, for their use of the imitation travertin stone in the construction of the Biltmore hotel in Los Angeles. The suit has been decided against Dennivelle on the ground that he did not get a patent until 2 years after he had placed the process and the product of the invention on sale and had sold both the process and the product for a profit. The effect of the court's decision is that anyone can use artificial travertin stone.—*American Contractor.*

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning April 28:

Central Freight Association Docket

10479. (Cancels D. A. No. 9824.) Crushed stone. Buffalo, N. Y., New Castle, Penn., Hillsville, Walford, Ellwood City, Penn., also points taking same rates as New Castle, Hillsville, Walford and Ellwood City to destinations in New York and Pennsylvania.. Proposed rates in cents per net ton from Hillsville, Penn.:

To	Buffalo, N. Y.	Newcastle, Penn.	Walford, Penn.	Ellwood City, Penn.
Adamsville, Penn.	160	105	105	105
Allen, Penn.	175	170	175	170
Bear Lake, Penn.	125	140	140	140
Bennezette, Penn.	175	175	185	175
Buffalo, N. Y.	....	185	185	185
Cadogan, Penn.	205	†	140	†
Clarion, Penn.	175	175	175	175
Coder, Penn.	175	150	150	150
Conifer, Penn.	185	160	175	160
Corry, Penn.	125	125	125	125
Cranesville, Penn.	125	105	105	105
Dunkirk, N. Y.	83	160	160	160
Erie, Penn.	115	115	115	115
Falconer, N. Y.	100	160	160	160
Franklin, Penn.	160	115	115	115
Greene, Penn.	175	175	185	175
Jamestown, N. Y.	100	160	160	160
Kittanning, Penn.	205	‡	140	‡
Lakeville, Penn.	140	140	140	140
Linesville, Penn.	160	105	105	105
McCormick, Penn.	195	160	170	160
Mill Village, Penn.	140	125	125	125
North East, Penn.	115	140	140	140
Oil City, Penn.	160	115	115	115
Platea, Penn.	125	105	105	105
Putneyville, Penn.	185	140	160	140
Sagamore, Penn.	195	170	160	170
Seminole, Penn.	185	140	160	140
Shippenville, Penn.	175	140	140	140
Springboro, Penn.	140	105	105	105
Swanville, Penn.	115	115	115	115
Tidioute, Penn.	160	150	150	150
Tionesta, Penn.	160	140	140	140
Tryonville, Penn.	140	125	125	125
Van, Penn.	175	140	140	140
Waterford, Penn.	125	125	125	125
Weedville, Penn.	175	175	185	175
Youngsville, Penn.	125	150	150	150

*Also applies from points accorded same rates.

†$1.15 net ton via B. R. & P., $1.40 P. R. R.
‡$1.15 via B. R. & P., $1.40 via other roads.

10482. Sand. Millington, Oregon, Ottawa, Sheridan, Utica and Wedron, Ill., to Salem, Ohio. Present, $3.53 per net ton; proposed, $3.40 per net ton.

19484. Crushed stone. Spore, Ohio, to Peerless, Centerburg, Croton and Johnstown, Ohio. Presnt, to Peerless, Centerburg, Groton and Johnstown, Ohio, 70 cents per net ton; to Hebron, Millersport and Thurston, Ohio, 80 cents per net ton; to Mansfield, 90 cents per net ton and to Columbus $1.20 per net ton; to Akron and Cleveland, sixth class in effect. Proposed, 60 cents per net ton to Peerless, Centerburg, Croton and Johnstown, Ohio; 70 cents per net ton to Nebron, Mansfield, Millersport, Thurston and Columbus, Ohio; 80 cents per net ton to Akron, Ohio, and 90 cents per net ton to Cleveland, Ohio.

10485. Stone dust. Piqua, Ohio, to New Philadelphia and Uhrichsville, Ohio. Present, 19½ cents; proposed, $2.02 per net ton.

10488. Sand and gravel. North Berne, Ohio to Columbus, Ohio, T. & O. C. delivery. Present, 80 cents per net ton; proposed, 70 cents per net ton.

10487. Sand and gravel. Lafayette, Ind., to Darlington, Ind. Present, 10½ cents; proposed, 88 cents per net ton.

10488. Agricultural limestone. Hillsville and Shaw Junction, Penn., to Walford, Penn. Present, no commodity rate in effect; proposed, 3½ cents.

10497. Crushed stone. Dunkirk, Ohio, to Millersburg, Ohio. Present rate, $1.20 per net ton; proposed, 90 cents per net ton.

10498. Crushed stone. Piqua, Ohio, to destinations in Kentucky and Ohio. Present, 20 cents to all points except Miami and Fernald, Ohio, 15 cents; proposed, $1.20 per net ton to Miami and Fernald, Ohio, $1.61 to Maysville, Dover and Augusta, Ky., $1.73 to Vanceburg and Concord, Ky., $1.84 to Garrison, Ky., $1.96 to Ashland, Russel and Limeville, Ky., and $2.07 per net ton to Catlettsburg, Ky.

10499. Sand and gravel. Whartons, Ind., to Michigan City, Ind., and La Porte, Ind. Present, sixth class; proposed, 88 cents per net to Michigan City, Ind., via N. J. I. & I., Wabash-C. I. & L. Rys., and 76 cents per net ton to La Porte, Ind., via N. J. I. & I., Wabash and P. M. Rys.

10500. Crushed stone. Chicago to Bremen, Ind. Present, $1.38 per net ton; proposed, $1.01 per net ton.

10501. Ashes, cinders (except mill cinder and pyrites ore cinder) and slag. Warren, Ohio, to points on N. Y. C. R. R. (west) and P. & L. E. R. R. Present rates, classification basis; proposed rates (per net ton):

P. & L. E. R. R.	
Struthers, Ohio	$ .50
Bentley, Ohio	.50
Quaker Falls, Penn.	.60
Hillsville, Penn.	.70
Walford, Penn.	.70
Lowellville, Ohio	.50
Robinson, Penn.	.60
Edenburg, Penn.	.70
Mahoningtown, Penn.	.70
New Castle, Penn.	.70
West Pittsburgh, Penn.	.70
Wampum, Penn.	.70
Crescentdale, Penn.	.70
West Ellwood Junction, Penn.	.90
Koppell, Penn.	.90
Ellwood Junction, Penn.	.90
Ellwood City, Penn.	.90
Beaver Falls, Penn.	.90
Fallston, Penn.	.90
Bridgewater, Penn.	.90
Beaver, Penn.	.90
Monaca, Penn.	.90
Stobo, Penn.	1.05
Allquippa, Penn.	1.05
Woodlawn, Penn.	1.05
South Heights, Penn.	1.05
Glenwillard, Penn.	1.05
Stoops Ferry, Penn.	1.05
Corapolis, Penn.	1.05
Montour Junction, Penn.	1.05
Groveton, Penn.	1.05
Brightwood, Penn.	1.05
Neville Island, Penn.	1.15
McKees Rocks, Penn.	1.15
Pittsburgh, Penn.	1.15
N. Y. C. R. R.	
Andover, Ohio	.80
Simons, Ohio	.90
Jamestown, Penn.	1.15
Salem, Penn.	1.15
Hadley, Penn.	1.15
Clarks Mills, Penn.	1.15
Branch, Penn.	1.15
Stoneboro (via N. Y. C. P. R. R.)	1.25
Sandy Lake, Penn.	1.25
Raymilton, Penn.	1.25
Dick Sand Co., Penn.	1.25
Niles, Penn.	1.25
Franklin, Penn.	1.25
Reno, Penn.	1.25
Oil City, Penn.	1.25

10502. (a) To establish on lime, carloads, from Limestown, Ohio, to C. F. A., points shown below, following rates:

Station.	
Adena, Ohio	$ .16
Alton, Ill.	.23½
Beach City, Ohio	.12½
Belle Vernon, Ohio	.17
Bellevue, Ohio	.09
Bessemer, Penn.	.17
Chicago, Ill.	.17
Connellsville, Penn.	.19
Danville, Ill.	.17
Evansille, Ind.	.23½
Ft. Wayne, Ind.	.14
Indianapolis, Ind.	.14
Johnstown, Penn.	.20
Lima, Ohio	.10
Mansfield, Ohio	.10
Orrville, Ohio	.10
St. Louis, Mo.	.23½
Steubenville, Ohio	.16
Terre Haute, Ind.	.17
Vincennes, Ind.	.22
Youngstown, Ohio	.14

(b) To include Limestown, Ohio, as an origin point on the same basis as Gibsonburg, Ohio, in tariffs naming commodity rates from Gibsonburg, Martin, Rocky Ridge and Woodville, Ohio, to other destinations in C. F. A. territory as described in C. F. A. T. B. Tariff 130-P.

10299. Sup. 1, common, hydrated, quick or slaked lime. C. L. Mitchell, Ind., to Madison, Portage, Mosinee, Wausau, Rothschild, Nekoosa, Eau Claire, Manitowoc, Neenah, Menasha, Appleton, Kimberly, Kaukauna, West Bend, Green Bay and Oconto Falls, Wis. Alternative basis of 19½ cents, minimum weight 40,000 lb.; also to hold this alternative basis as a maximum at points intermediate thereto, also to destinations mentioned in Docket Bulletin No. 712. Present rates, to West Bend, 20½ cents; to Manitowoc, Neenah, Menasha, Appleton, Kimberly and Kaukauna, 21 cents; to Madison, Portage, Mosinee, Wausau, Rothschild, Nekoosa, Green Bay and Oconto Falls, 21½ cents; to Eau Claire, Wis., 27 cents. Minimum weight 30,000 lb.

10509. Crushed stone. Kenton, Ohio, to Washington Court House, Ohio, via N. Y. C.-O. C. L. Lines, Columbus, Ohio, and B. & O. R. R. Present, 15 cents; proposed, 90 cents per net ton.

10517. Crushed stone and stone screenings. Annandale, Branchton, Harrisville, Osbornes and Wick, Penn., to Lawsonham, Penn., also to Rimersburg and Sligo, Penn. Present rates, $2.65 per net ton. Proposed, $1.40 per net ton to Lawsonham, Penn.; $1.60 per net ton to Rimersburg and Sligo, Penn.

10520. Crushed stone, sand and gravel. Kenneth and Lake Ciecott to New Castle, Ind. Present, $1.15 per net ton; proposed, $1.01 per net ton.

10521. Molding sand. Nickel, Ind., to Litchfield, Ill. Present, $3.28 per net ton; proposed, $2 per net ton.

10522. River sand and gravel. Pittsburgh, Penn., to McKees Rocks, Penn. Present, 70 cents per net ton; proposed, 50 cents per net ton.

10523. Crushed stone. North Baltimore, Ohio, to Akron, New London, Spencer and Mogadore, Ohio. Present, $1.10 to Akron and Spencer, Ohio; $1 to New London, and sixth class rate to Mogadore, Ohio. Proposed, 90 cents per net ton to Akron, New London and Spencer, Ohio; $1 per net ton to Mogadore, Ohio.

10526. Sand and gravel. Noblesville, Ind., to Durbin, Lapel, Bloomer and Anderson, Ind. Present, 65 cents per net ton to Durbin and Lapel, Ind., and 81 cents per net ton to Bloomer and Anderson, Ind. Proposed, 60 cents per net ton.

10530. Cement, Hannibal, Mo., to Windsor, Ont. Present, 34½ cents; proposed, 21½ cents.

10531. Crushed stone. Huntington, Ind., to Kewanna, North Judson, Muncie and Richmond, Ind. Present, sixth class; proposed, 88 cents per net ton to Kewanna, Ind.; $1.10 per net ton to North Judson, Ind.; $1.01 per net ton to Muncie, Ind., and $1.27 per net ton to Richmond, Ind.

In cents per net ton—From Lehigh, Ill., Kankakee, Ill., to C. L. S. & S. B. Ry. stations, Tremont, Ind., and Michigan City, Ind. Present, $1.01; proposed, 95 cents.

From Thornton, Ill., to C. L. S. & S. B. Ry. stations—Tremont, Ind., and Michigan City, Ind. Present, 95 cents; proposed, 88 cents.

Illinois Freight Association Docket

3144. Crushed stone. Carloads, minimum weight marked capacity of car from Lehigh, Kankakee and Thornton, Ill., to Wenona, Ill. Rates in cents per net ton. Present, from Lehigh-Kankakee, 100; proposed, 88. Present, from Thornton, 113; proposed, 101.

Southern Freight Association Docket

19883. Sand and gravel. Carloads, from Montgomery, Ala., to Opp. Ala. Present rates, sand, $1.16⅔; gravel, $1.30 per net ton. Proposed, $1.12½ per net ton based on the proposed single line scale submitted by carriers to the Georgia and Alabama Commissions, less 10%.

19935. Lime. It is proposed to establish a rate of $1.35 per net ton on lime, carload, from Calera, Newala and Roberta, Ala., to Anniston, Ala., in lieu of present rate of $1.47 per net ton, which is made in line with kilns located on the L. & N. R. R.

19936. Cement. Carloads, from Clinchfield, Ga. (formerly Coreen, Ga.), to Tallulah Falls Ry. stations. Combination rates now apply. Proposed, 16 cents per 100 lb., same as in effect from Birmingham, Leeds, Ala., Richard City, Tenn., etc.

19945. Marble, crushed, etc. It is proposed to establish commodity rates on marble, crushed, ground or pulverized, carloads, from Tate, Ga., to Ann Arbor, Holland, Mich., Decatur, Ind., Urbana, Ohio, and Elmhurst, Ill., made on the same basis as rates to other C. F. A. points. At present combination rates apply.

19946. Sand and gravel. Carloads, from Carrollton, Ky., to Maurice, Independence and Bank Lick, Ky. Present rates, to Maurice, $1.90; to other points, $1.30 per net ton. Proposed rate, $1.10 per net ton.

19947. Stone, crushed. Carloads, from Moretti, Ala., to Cartersville, Ga. Present rate: No rate now provided. Proposed, 7 cents per 100 lb. made no higher than in effect from more distant quarries of Brownson and Gantts Quarry, Ala.

19965. Gravel or sand. It is proposed to revise the rate on gravel and sand, carloads, from Montgomery, Ala., to Pensacola, Fla., via W. Ry. of Alabama and establish a rate of $1.44 per ton in lieu of present rate of $1.40 per ton. This in order that the rate applicable via the W. Ry. of Alabama and the L. & N. R. R. route may be on a parity.

20007. Crushed stone. It is proposed to establish commodity rates on stone, crushed, carloads, from Whitestone, Ga., to destinations in Central Freight Association territory, made on the same basis as rates from Whitestone, Ga., to other C. F. A. points. Statement of proposed rates will be furnished interested parties upon request. Combination rates now apply to the points of destination involved.

Indiana Crushed Stone Rate Case Settled

IN the matter of the complaint of the Mid-West Crushed Stone Co. vs. the C. & E. I. R. R. Co., et al, the Public Service Commission of Indiana issued orders July 25, 1924, setting forth the rates to be charged on shipments of crushed stone in carloads in Indiana intrastate traffic and subsequently the defendant applied to the Circuit Court of Sullivan County, Ind., for an order restraining the commission from the enforcement of said order.

The matter was held in abeyance pending negotiations with complainants seeking a compromise basis, and parties interested applied to the commission for a modification of the order setting forth rates agreed upon.

The following table shows present, prescribed and Indiana scale rates and proposed rates, effective May 1:

		From Greencastle, Ind.					From Spencer, Ind.				
To	Columns*	1	2	3	4	Miles‡	1	2	3	4	Miles‡
Cayuga		112	85	88	95	51- 60	.....	.....	.....	.....	.....
Worth		107	80	88	90	41- 50	.....	.....	.....	.....	.....
Summi ve		107	80	88	90	41- 50	.....	.....	.....	.....	.....
Clinton		104	75	88	85	31- 40	.....	.....	.....	.....	.....
Atherto		104	75	85	85	31- 40	.....	.....	.....	.....	.....
Young		101	75	85	85	31- 40	101	100	101	110	81- 90
Pimento		101	75	85	85	31- 40	101	100	101	110	81- 90
Seifert		101	75	88	85	31- 40	101	100	101	110	81- 90
Farmersburg		101	75	88	85	31- 40	101	100	101	110	81- 90
Shelburn		101	80	88	90	41- 50	101	100	101	110	81- 90
Sullivan		101	80	88	90	41- 50	101	100	101	110	81- 90
Paxton		101	85	90	95	51- 60	101	95	101	110	81- 90
Carlisle		101	85	90	95	51- 60	101	95	101	105	71- 80
Oaktown		101	90	95	100	61- 70	101	90	95	100	61- 70
Emison		101	90	95	100	61- 70	85	85	95	100	61- 70
Vincennes		101	95	100	105	71- 80	90	.....	.....	.....	.....
Purcell		113	100	105	110	81- 90	95	90	95	100	61- 70
Volmer		113	100	105	110	81- 90	95	90	95	100	61- 70
Decker		113	100	105	110	81- 90	100	90	95	100	61- 70
Hazelton		113	100	105	110	81- 90	100	90	95	100	61- 70
Patoka		113	100	105	110	81- 90	100	95	100	105	71- 80
Princeton		113	100	105	110	81- 90	105	95	100	105	71- 80
Ft. Branch		113	105	105	115	91-100	105	100	100	110	81- 90
Haubstadt		113	105	105	115	91-100	107	100	103	110	81- 90
Ingle		113	110	105	120	101-115	107	100	103	110	81- 90
Evansville		113	110	105	120	101-115	107	105	103	115	91-100
Owensville		113	105	105	115	91-100	107	100	103	110	81- 90
Mounts		113	110	105	120	101-115	113	100	103	110	81- 90
Knowles		113	110	105	120	101-115	113	100	103	110	81- 90
Cynthiana		113	110	105	120	101-115	113	100	103	110	81- 90
Poseyville		113	110	105	120	101-115	113	105	103	115	91-100
Wilson		126	110	115	120	101-115	120	105	110	115	91-100
Wadesville		126	110	115	120	101-115	120	105	110	115	91-100
Springfield		126	115	120	125	116-130	120	110	115	120	101-115
Erwin		126	115	120	125	116-130	120	110	115	120	101-115
Mt. Vernon		126	120	120	130	131-150	120	110	115	120	101-115
Hymera		.....	.....	88	.....	.....	.....	.....	101	.....	.....
Jackson Hill		.....	.....	88	.....	.....	.....	.....	101	.....	.....
Dell Carbon		.....	.....	88	.....	.....	.....	.....	101	.....	.....
New Pittsburgh		.....	.....	88	.....	.....	.....	.....	101	.....	.....

*Columns: 1, present rates; 2, rates prescribed; 3, rates proposed; 4, Indiana scale.
‡Mileage based on tentative Indiana scale.

Investigate Southern California Rock and Gravel Rates

RATE proceedings have been started at Long Beach, Calif., the State Railroad Commission that will materially affect rock and gravel companies throughout Southern California.

The Union Rock Co. has joined with several other rock and gravel companies and the county of Los Angeles, and has taken action under a complaint against the Southern Pacific, Santa Fe and Pacific Electric railroads. It is charged that the existing rates on shipments of crushed rock, sand and gravel from points in Southern California are unjust, excessive and discriminating.

Other concerns joining with the Union Rock Co. at the hearing are the Orange County Rock Co., Saticoy Rock Co., and Blue Diamond Co.

Oklahoma Cement Case Dismissed

THE Commission has dismissed No. 14914, Oklahoma Portland Cement Co. vs. St. Louis-San Francisco et al., mimeographed, finding that the rates on cement from Ada, Okla., to destinations on the Texas & Pacific, directly intermediate to New Orleans, higher than to New Orleans, has not been shown to have been unreasonable. It further found that the propriety of the relationship of the rates to New Orleans and to the intermediate points involved should not be determined in advance of a hearing on the fourth section applications under which the Texas & Pacific maintained the lower rate to New Orleans. The applications were not set for hearing in connection with this case. The intermediate points are around Alexandria, La., south of Shreveport, on that part of the Texas & Pacific after it makes its bend to the south and runs along the Red and Mississippi rivers.—*Traffic World.*

Indiana Gravel Rates Arbitrated

THE Public Service Commission of Indiana recently approved a scale of rates on sand and gravel in carloads in modified order No. 7448, in conformity with an agreement reached between the Terre Haute Gravel Co., et al, complainants and the C. & E. I. R. R. Co., defendant.

The matter had been held in abeyance following an appeal by the defendant to the Circuit Court of Sullivan County, Ind., for an order restraining rates prescribed by the commission on July 25, 1924.

The following sets forth the present, prescribed, Indiana scale and proposed rates on sand and gravel from Summit Grove, Ind., to Indianapolis, in cents per net ton:

	From Summit Grove, Ind.			
To	*Columns 1	2	3	4
Cayuga	63	50	60	60
Worthy	63	50	60	60
Clinton	50	50	60	50
Atherton	....	....	....	50
Terre Haute	50	50	60	50
Young	60	55	65	60
Pimento	75	55	65	60
Seifert	75	60	70	65
Farmersburg	75	60	70	65
Shelburn	80	60	70	70
Sullivan	80	65	75	70
Paxton	80	65	75	75
Carlisle	80	70	80	75
Oaktown	85	75	85	75
Emison	85	75	85	75
Vincennes	90	80	90	85
Purcel	95	85	95	85
Volmer	95	85	95	90
Decker	95	85	95	90
Hazelton	95	85	95	90
Patoka	95	90	100	90
Princeton	95	90	100	90
Ft. Branch	95	95	105	95
Haubstadt	95	95	105	95
Ingle	100	100	110	95
Evansville	100	100	110	95
Owensville	95	95	110	95
Mounts	100	100	110	95
Knowles	100	100	110	95
Cynthiana	100	100	110	95
Poseyville	100	100	110	95
Wilson	100	100	110	95
Wadesville	100	100	110	95
Springfield	100	100	115	100
Erwin	100	100	115	100
Mt. Vernon	100	100	120	100
Hymera	....	....	....	70
Jackson Hill	....	....	....	70
Dell Carbon	....	....	....	70
New Pittsburg	....	....	....	70

*Columns 1. Present rate. 2. Rate prescribed. 3. Indiana scale. 4. Rate proposed.

The proposed rates become effective on May 1.

Acme Cement Case Dismissed

IN the issue of ROCK PRODUCTS of April 18 were articles bearing on the receivership proceedings filed against the Acme Cement Corporation of Catskill, N. Y., by C. H. Breerwood.

Official information has been received that the Chancery Court of Delaware has dismissed the action of Mr. Breerwood on its merits. The attorneys for the plaintiff stated that their complaint was based on erroneous information. The position of the majority stockholders of the company was sustained in all respects and the cost of the action assessed against Mr. Breerwood.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Northern New Jersey	1.60	1.80	1.80	1.40	1.40	.....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.75	... .	1.75	1.50	.....	.....
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo, Iowa	1.10	.....	1.35	1.05	1.10	1.10
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.20	1.20	1.20	1.10	1.10	1.10
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	1.05	.90	.90	.90	.90
Gary, Ind.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.30	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood, Iowa	1.00	1.25	1.25	1.05	1.05	1.15
Northern New Jersey	1.30	.....	1.80	1.60	1.40	.....
River Rouge, Mich.	1.00	1.00	1.00	1.00	1.00	1.10
Sheboygan, Wis.	1.10	.....	.....	1.10	1.10	.....
St. Vincent de Paul, P. Q.	.85	1.35@1.45	1.00@1.10	.95@1.00	.90	1.00
Stone City, Iowa	.75	.....	1.20†	1.10	1.05	.....
Toronto, Ont.	1.60	1.95	1.80	1.80	1.80	1.80
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	1.00	.....	.90	.90	.....
Youngstown, Ohio	.....	.....	.....	**1.50**	**1.60**	**1.60**
SOUTHERN:						
Alderson, W. Va.	.50	1.60	1.60	1.50	1.40	1.20
Bridgeport, Texas	1.00	1.00@1.35	1.35	1.25	1.25	1.10
Cartersville, Ga.	1.65	1.65	1.65	1.15	1.15	1.35
El Paso, Texas	1.00	1.00	1.00	1.00	1.00	.....
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	.....
Graystone, Ala.			Crusher run fluxing stone, 1.00 per net ton			
Rockwood, Ala.	1.00	.....	.....	1.25	1.00	.....
WESTERN:						
Atchison, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.[illegible]	1.65	1.65	1.65	1.65
Rock Hill, Mo.	1.55	1.15	1.15	1.15	1.10	1.10

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, Wallingford and Britain, Conn.	.60	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50	2.00	1.80	1.40	1.40	.....
Oakland and El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	.....
San Diego, Calif.	.50@.75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	1.70	2.10	2.00	1.70	1.60	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite	.50	2.00	1.75	.....	1.60	.....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	**1.20**
Lithonia, Ga.	.75	.....	1.75b	1.25	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	**1.50**	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	.....
Richmond, Calif. (Basalt)	.75*	.....	1.50*	1.50*	1.50*	.....

*Cubic yd. †1 in. and less. ‖Rip rap per ton. (a) Sand. (b) To ¼ in.

Agricultural Limestone

(Pulverized)

Alton, Ill. — Analysis, 97% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	**2.75**
Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93.5% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh	1.50
Cartersville, Ga. — Analysis, 68% $CaCO_3$, 32% $MgCO_3$; pulverized	3.00
50% thru 100 mesh	1.75
Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk	2.50
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, $5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk	3.60
Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags	5.00
Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Waukesha, Wis.—Pulverized	4.00
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; bags, 4.00; bulk	2.50
West Stockbridge and Rockdale, Mass., Danbury, Conn. — Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25

Agricultural Limestone

(Crushed)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Alton, Ill. — Analysis, 97% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	2.00
Bedford, Ind.—Analysis, 98½% $CaCO_3$, 1% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—77% $CaCO_3$; 100% thru 8 mesh, 25% thru 100 mesh	1.00
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80
Chico, Texas—100% thru 4 mesh..... 1.50
100% thru 10 mesh, bags, 5.00; bulk 2.00
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh 1.20
Cypress, Ill.—90% thru 100 mesh..... 1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh..... 1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh..... 1.50
Garrett, Okla.—All sizes 1.25
Gary, Ill. — Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .60
Kansas City, Mo.—50% thru 100 mesh 1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh..... 2.00
Screenings (¼ in. to dust)..... 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh..... 1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind. — Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh..... 1.60
Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh, 38% thru 50 mesh.... 1.45@ 1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh..... 1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh..... 1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh..... 1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh..... .75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk 2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk..... 3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk .. 3.00@ 3.50
Waukesha, Wis.—Bulk 4.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton.

Glass Sand:
Berkeley Springs, W. Va..... 2.00@ 2.25
Cedarville and S. Vineland, N. J.—
Damp 1.75
Dry 2.25
Cheshire, Mass:
6.00 to 7.00 per ton; bbl..... 2.50
Estill Springs and Sewanee, Tenn..... 1.50
Gray Summit and Klondike, Mo..... 2.00
Los Angeles, Calif.—Washed..... 5.00
Mapleton Depot, Penn..... 2.00@ 2.25
Massillon, Ohio 3.00
Mineral Ridge and Ohlton, Ohio..... 2.50
Oceanside, Calif. 3.00
Ottawa, Ill.—Chemical and mesh guaranteed 1.50
Pittsburgh, Penn.—Dry 4.00
Damp 3.00
Red Wing, Minn.:
Bank run 1.50
Ridgway, Penn. 2.50
Rockwood, Mich. ..... 2.75@ 3.25
Round Top, Md. 2.25
San Francisco, Calif..... 4.00@ 5.00
St. Louis, Mo..... 2.00
Sewanee, Tenn. 1.50
Thayers, Penn. 2.50
Utica, Ill. ..... 1.00@ 1.35
Zanesville, Ohio 2.50

Miscellaneous Sands:
Aetna, Ind.:
Core, Box cars, net, .35; open-top cars ..... .30
Albany, N. Y.:
Core 1.25
Molding coarse 2.00
Molding fine, brass molding..... 2.25
Sand blast 4.00
Arenzville and Tamalco, Ill.:
Molding fine and coarse..... 1.40@ 1.60
Brass molding 1.75
Beach City, Ohio:
Fine core..... 1.75
Furnace bottom..... 2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Erie, Penn.		1.25		1.50	1.75	
Farmingdale, N. J.	.58	.48	1.05	1.20	1.10	
Machias Jct., N. Y.		.75	.75	.75	.75	.75
Montoursville, Penn.	1.00@1.10	1.10@1.25		.85	.75	.75
Northern New Jersey		.50	1.25	1.25	1.25	
Olean, N. Y.		.90	.75	.75	.75	.75
Pittsburgh, Penn., and vicinity	1.25	1.25	1.00	1.00	.85	.85
Shining Point, Penn.			1.00	1.00	1.00	1.00
Washington, D. C.—Rewashed, river	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.		.60	.80	.80	.80	
Chicago, Ill.	1.35	1.75	1.75	1.75	1.75	1.75
Columbus, Ohio	.75	.75@1.00	.75	.75@1.00	.75@1.00	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.60@ .80	.40	.80			.85
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.60
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.		.50		.80	.70	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.	.40					1.25
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.*	.35	.35	1.35	1.25	1.25	1.25
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.45@ .50	.45@ .50		1.25	1.25	
Palestine, Ill.	.75	.75	.75	.75	.75	.75
St. Louis, Mo., f. o. b. cars	1.18	1.45	1.65‖	1.45		1.45‖
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.90	.90	.85	.85
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.55	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.00	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .40@.60			
Zanesville, Ohio.	.70	.60	.60	.60	.90	.90
SOUTHERN:						
Brookhaven, Miss., Roseland La.	1.75*	.70	2.25	1.50	1.25	
Charleston, W. Va.	All sand 1.40 f.o.b. cars.			All gravel 1.50 f.o.b. cars.		
Chehaw, Ala.	00@ .30		.40	.50		
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	.50		.75		.65	.65
New Martinsville, W. Va.	.90	.90				.90
Roseland, La.	.80	.70	1.50	1.50	1.25	1.25
Smithville, Texas		.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	
Kansas City, Mo.	.80	.70				
Los Angeles, Calif.	.50	.50	.92	.92	.92	
Pueblo, Colo.	1.10*	.90*		1.60*		1.50*
San Diego, Calif.	.50	.50	1.20	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50	1.50	1.50	1.50	1.50	1.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss., Rosel'd, La.			Road gravel, ballast gravel .60 a ton			
Chehaw, Ala.	00@ .30					
Des Moines, Iowa			Washed, .65; unwashed, .40 (not screened)			
Dudley, Ky. (crushed silica)	1.10	1.10		.95		
East Hartford, Conn.			Sand, .65 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas						.55
Macon, Ga.		.35				
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.			Mine run gravel 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10					
Zanesville, Ohio						.55

*Cubic yd.; (b) river run.

Miscellaneous Sands

(Continued from preceding page)

Molding fine and coarse		2.00
Traction unwashed and screened		1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse		5.00
Sand blast	5.00@	8.00
Stone sawing		6.00
Dresden, Ohio:		
Core	1.25@	1.50
Molding fine	1.50@	1.75
Molding coarse		1.50
Traction		1.25
Brass molding		1.75
Eau Claire, Wis.:		
Roofing sand		3.00
Sand blast	3.00@	3.25
Stone sawing	2.50@	3.00
Traction, wet, .35; dry		.65
Elco, Ill.:		
Ground silica per ton in carloads	22.00@	31.00
Estill Springs and Sewanee, Tenn:		
Molding fine and core		1.25
Roofing sand, sand blast, traction	1.35@	1.50
Franklin, Penn.:		
Core, molding fine and coarse, brass molding		1.75
Gray Summit and Klondike, Mo.:		
Core		1.75
Molding fine, stone sawing	1.75@	2.00
Joliet, Ill.:		
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@	.85
Kasota, Minn.:		
Stone sawing (not screened or dried)		1.25
Mapleton Depot, Penn.:		
Molding fine and sand blast		2.00
Traction	2.00@	2.25
Massillon, Ohio:		
Molding fine, coarse, furnace lining core and traction		2.50
Michigan City, Ind.:		
Core and traction	.30@	.40
Mineral Ridge and Ohlton, Ohio:		
Molding fine and coarse, traction, furnace lining, all green		1.60
Core, roofing sand, sand blast, stone sawing, all green		1.75
Montoursville, Penn.:		
Core		1.35
Traction	1.10@	1.35
New Lexington, Ohio:		
Molding fine		2.50
Molding coarse		1.50
Oceanside, Calif.:		
Roofing sand		3.50
Ottawa, Ill.:		
Molding coarse (crude silica sand)	.75@	1.00
Sand blast		3.50
Stone sawing		1.50
Red Wing, Minn.:		
Core, furnace lining, stone sawing		1.50
Molding fine and coarse, traction		1.25
Sand blast		3.50
Filter sand		3.75
Ridgway, Penn.:		
Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Round Top, Md.:		
Core		1.60
Traction, damp		1.75
Roofing sand		2.25
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50

Crushed Slag

City or shipping point		¼ in.	½ in.	¾ in.	1½ in.	2½ in.	3 in.
EASTERN:	Roofing	down	and less	and less	and less	and less	and larger
Buffalo, N. Y.	2.35	1.35	1.35	1.35	1.35	1.35	1.35
E. Canaan, Conn.	3.00	1.00	2.25	1.25	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Emporium and Du Bois, Penn.		1.35	1.35	1.35	1.35	1.35	1.35
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45		1.45		1.45	
Jackson, Ohio		1.05		1.30	1.05	1.30	1.05*
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	2.05	1.55		1.55	1.55	1.55	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

*¼ in. to 1½ in.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing	Masons'	Agricultural	Chemical	Ground burnt lime,		Lump lime,	
EASTERN:	hydrate	hydrate	hydrate	hydrate	Blk.	Bags	Blk.	Bbl.
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		12.00	12.00	12.00				
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.		10.50	5.60					2.25m
Williamsport, Penn.			10.00				6.00	
York, Penn.		10.50	10.50	11.50			8.50	1.65i
CENTRAL:								
Cold Springs, Ohio		10.00	9.00		9.00	11.00	9.00	
Delaware, Ohio	12.50	10.00	9.00	10.50			9.00	1.50
Gibsonburg, Ohio	12.50				9.00	11.00		
Huntington, Ind.	12.50@14.50	10.00	9.00		9.00	11.00	9.00	
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		10.00	9.00				9.00	1.50c
Marion, Ohio		10.00	9.00				9.00	1.70
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.70e
Sheboygan, Wis.							8.50t	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50							
Woodville, Ohio (f)	12.50	10.00	9.00	12.50	9.00	10.50	9.00	1.50
SOUTHERN:								
Erin, Tenn.							7.80	1.25
El Paso, Texas							9.00	2.00
Graystone, Ala.	12.50	11.00		10.00		1.35u	8.50	1.50
Karo, Va.		10.00	9.00				7.00g	1.65h
Knoxville, Tenn.	20.50	11.00		11.00			8.50	1.50
Varnons, Ala. (f)		10.00p	10.00p				8.00q	1.40r
Zuber and Ocala, Fla.	14.00	12.00	10.00				12.00	1.70
WESTERN:								
Kirtland, N. M.							15.00	
San Francisco, Calif.	20.00†	20.00†	15.00s	20.00†				2.50o
Tehachapi, Calif.							16.20	

†50-lb. paper bags, burlap 24.00; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) wood bbl., $2.20 drum in steel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180 lb. bbl.; 265, 280-lb. bbl.; (l) bags; (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium, common 1.90; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) in bbls.; (u) two 90-lb. bags.

Miscellaneous Sands

(Continued)

Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif:		
(Washed and dried) — Core, sand blast and brass molding	3.50@	5.00
Furnace lining and roofing sand	3 50@	4.50
Molding fine and traction		3.50
Molding coarse		4.50
(Direct from pit)—Core and molding fine	2.50@	4.50
Sewanee, Tenn.:		
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding		1.25
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.25
Traction		2.25
Utica, Ill.:		
Core, furnace lining, molding, fine and coarse	.60@	1.00
Roofing sand, stone sawing	1.00@	2.00
Sand blast		2.00
Traction		1.00
Brass molding	1.00@	1.35
Utica, Penn.:		
Core		2.00
Molding fine and coarse		1 75
Warwick, Ohio.:		
Core, molding coarse (green) 2.00; (dry) 2.50; traction		2.50
Zanesville, Ohio:		
Core		1.75
Molding fine, brass molding	1.75@	2.00
Molding coarse	1.50@	1.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel workers' crayons, per gross		1.25
Chatsworth, Ga.:		
Crude (for grinding)		5.00
Ground (150-200 mesh) bags		10.00
Pencils and steel workers' crayons, per gross	1.00@	2.00
Chester, Vt.:		
Ground (150-200 mesh); bulk	9.00@	10.00
Bags	10.00@	11.00
(Bags extra, returnable)		
Chicago, Ill.:		
Ground (150-200 mesh) bags		30.00
E. Granville, Rochester, Johnson, Waterbury, Vt.:		
Ground talc (20-50 mesh) bags	7.00@	10.00
Ground talc (150-200 mesh) bags	10.00@	25.00
Pencils and steel workers' crayons, per gross	.75@	2.00
Emeryville, N. Y.:		
(Double air floated) including bags; 325 mesh (50 lb. paper, 100 & 200 lb. burlap bags)		14.75
Hailesboro, N. Y.:		
Ground (150-200 mesh) bags		18.00
Ground (200-300 mesh) bags		20.00
Henry, Va.:		
Crude talc (mine run) per 2000-lb. ton	2.75@	3.50
Ground (150-200 mesh), bags	9.00@	14.00
Joliet, Ill.		
Ground (200 mesh), bags		30.00
Keeler, Calif.:		
Ground (200-300 mesh), bags	20.00@	30.00
Marshall, N. C.:		
Crude	4.00@	8.00
Ground (20-50 mesh), bags extra	6.50@	8.50
Ground (150-200 mesh), bags	8.00@	12.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), bags		13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%	4.50@	5.00
Mt. Pleasant, Tenn.—B.P.L. 75%		6.50
75% hand mined		6.50
75% (free of fines for furnace use)	6.50@	6.75
75% max. 5½% I and A	6.50@	7.00
78% max. 4½% I and A		8.00
72% B.P.L.	5.00@	6.00
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@	8.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12, 24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10, 18x10, 18x9, 18x12	12.60	11.00	8.70	8.75
16x10, 16x9, 16x8, 16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x8	11.10	10.50	8.10	7.80
14x7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Ground Rock
(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 68-72%..	4.00@ 5.00
Mt. Pleasant, Tenn. — B.P.L. 65% 95% thru 100 mesh	7.00
13% phosphorus, 95% thru 80 mesh	5.75
Twomey, Tenn.—B.P.L., 65%	7.00@ 8.00

Florida Phosphate
(Raw Land Pebble)
Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.50
70% min, B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	18.00@19.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	19.00@20.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per gross ton	18.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt.‡—English cream	9.00	9.00
English pink	9.00	9.00
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		8.00@10.00
Easton, Penn., and Phillipsburg, N. J.—Green granite	16.00@20.00	9.00@15.00
Talc		9.00@11.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags	†12.50	†12.50
Ingomar, Ohio (in bags)		4.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.‡—Middlebury white	9.00	9.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Cal. — "Natrock" roofing grits		12.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C. L., 15.50.
‡C.L. lots, for L.C.L. add 3.50 per ton. Add 2.00 per ton for bags.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	28.00@35.00
Baltimore, Md. (Del. according to quantity)	16.00@16.50	22.00@50.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	14.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	15.25	21.50
Portland, Ore.	19.00	25.00@45.00
Prairie du Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	18.00@21.00	35.00@37.50
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00
Plant City, Fla.	11.00@15.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Syracuse, N. Y.	*18.00
Washington, D. C.	14.50
Wilkinson, Fla. (white and buff)	11.00@16.00

*Mill price, $20.00 delivered.

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, per ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.8‡
Boston, Mass.	20.00	14.00@15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	———
Dallas, Tex.	20.00	———
Denver, Colo.	24.00	———
Detroit, Mich.	15.50	15.50
Kansas City, Mo.	19.50	18.50
Los Angeles, Calif.	18.00	———
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	———	21.00
New Orleans, La.	24.50	17.00
New York, N. Y.	18.20	12.00@13.10
Philadelphia, Penn.	23.00	16.00
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	22.00	———
Seattle, Wash. (paper sacks)	24.00	———

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl.
Boston, Mass.	.63	2.53@2.63
Buffalo, N. Y.	.60	2.38@2.48†
Cedar Rapids, Iowa	———	2.44
Cincinnati, Ohio	———	2.47
Cleveland, Ohio	———	2.39
Chicago, Ill.	———	2.20
Columbus, Ohio	———	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	———	2.39
Dayton, Ohio	———	2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.	———	2.25
Duluth, Minn.	———	2.19
Indianapolis, Ind.	———	2.41
Kansas City, Mo.	.51¾	2.07
Los Angeles, Cal. (less 5c dis.)	.60	2.60
Louisville, Ky.	———	2.45
Memphis, Tenn.	———	2.60
Milwaukee, Wis.	———	2.25
Minneapolis, Minn.	———	2.42
Montreal, Que.	———	1.90
New York, N. Y.	———	2.15@2.25
Philadelphia, Penn.	.58	2.31@2.41
Pittsburgh, Penn.	———	2.19
San Francisco, Calif.	.65¼	2.71*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	———	2.42
Seattle, Wash. (10c bbl. dis.)	———	2.65
Toledo, Ohio	———	2.40

NOTE—Add 40c per bbl. for bags.
*Including sacks at 10c each.
†Prices to contractors, including bags.
(a) Less 10c 20 days.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	———	1.95
Concrete, Wash.	———	2.35
Dallas, Texas	.52½	2.50*
Hannibal, Mo.	———	2.05
Hudson, N. Y.	———	2.05
Leeds, Ala.	———	1.95
Nazareth, Penn.	———	1.95
Northampton, Penn.	———	1.95

*Including sacks at 10c each.

Cement Products

Hawthorne tile, carload lots, f. o. b. plant.

	Cicero, Ill. Per sq.	Ft. Worth, Tex. Per sq.
Silver gray	———	8.00
Red French	9.50	9.00
Green French	11.50	10.00
Red Spanish	10.00	9.00
Green Spanish	12.00	10.00

	—Cicero— Red	Green	—Ft. Worth— Gray	Red	Green
Ridges	.25	.35	.25	.25	.30
Hips	.20	.30	.14	.14	.17
Ridge closers	.05	.06	.06	.06	.06
Hip terminals, 3 way	1.25	1.50	1.00	1.00	1.25
Hip starters	.50	.60	.22	.22	.25
Gable finials	1.25	1.50	1.00	1.00	1.25
Gable starters	.20	.30	.14	.14	.16
End bands	.20	.30	———	———	———
Eave closers	.06	.08	.06	.06	.06

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa.	3.00	4.00	8.00	7.00	10.00	9.50	10.00	———	25.80	11.00	———	———	———
Douglas, Ariz.	———	———	7.00	———	16.50	———	19.50	———	———	15.50	———	———	———
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	———	26.55	20.00	———	———	———
Gypsum, Ohio‡	3.00	4.00	6.00	9.00	9.00	9.00	18.00	7.00	30.15	20.00	———	20.00	30.00
Hanover, Mont.	———	———	———	11.80	———	———	———	———	———	———	———	———	———
Los Angeles, Calif.	———	———	———	10.50	———	———	12.30	———	———	———	———	———	———
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	———	20.00	30.00
Portland, Colo.	———	———	———	10.00	———	———	———	———	———	———	———	———	———
Sigurd, Utah	———	———	———	———	———	———	———	———	18.00a	———	———	———	———
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	———	———	———	———	28.50	———	34.00

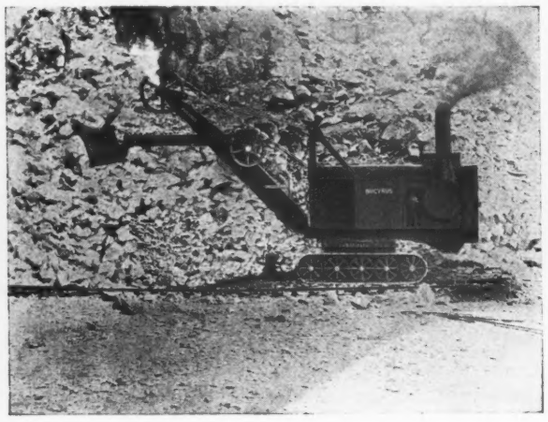
NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00.

New Machinery and Equipment

A New Quarry Shovel

THE Bucyrus Co., South Milwaukee, Wis., has just announced a new shovel that is fundamentally different from anything yet placed on the market.

Realizing the fact that the first cost of a shovel is of minor importance as compared with a low maintenance cost, especially for severe service, such as in quarries, mines and for other work where extremely hard digging conditions are encountered, Bucyrus engineers have developed a 4-yd., full-revolving shovel which is claimed to combine the rugged strength, power and speed of a railroad type shovel, with the greater mobility and the full-circle swing of a revolving shovel.



New extra strong revolving quarry shovel—view shows shovel with steam power—also made in electric models

This machine is known as the 120-B. It is caterpillar mounted and may be operated by steam or by electricity.

It is said to be built with a close-coupled strength, sturdiness and digging power, heretofore found only in the railroad-type shovel. For example, the boom is about the same length as that on a 115-ton railroad-type shovel, and at the same time, its shafts are designed with from 30 to 50% greater strength than heretofore used in conservative design.

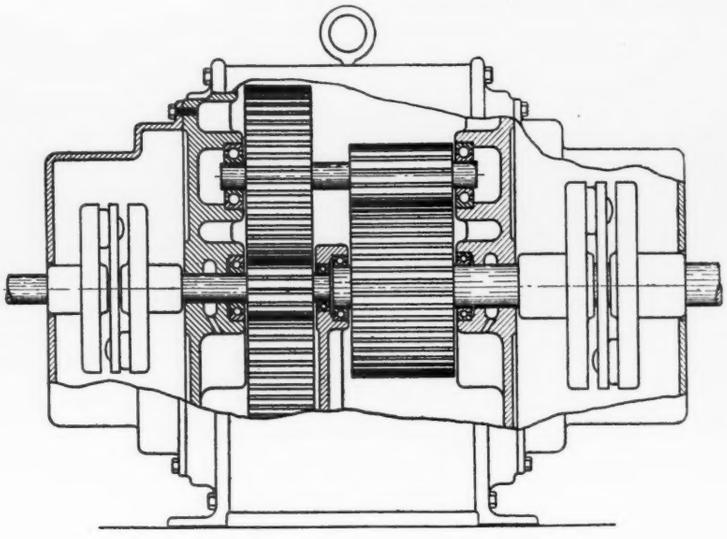
The base and the revolving frame are of solid casting construction without structural work, rivets or bolts. These units incorporate even greater solidity of design than the heavy front end construction of a railroad-type shovel.

It contains refinement of design such as superheater equipment, fire brick arch in the boiler, and brass shell bearings, never before offered as standard with any shovel.

The grate area of the boiler is said to be 10% more and the heating surface 15% greater than the most powerful railroad-type shovel. With superheater equipment the boiler efficiency is further increased by the reduction of water and coal consumption by from 20 to 30%.

It is said to be the largest shovel that has yet been mounted on caterpillars.

This shovel is designed to meet the growing demand for a quick-acting, full-revolving shovel of large dipper capacity, with greater strength, greater power and greater mobility, than has heretofore been produced, and at the same time with clearances which will enable it to operate in confined spaces and narrow cuts. It is not intended for work where very wide digging and dumping reaches are required.



Ball-bearing spur-gear speed reducer

Ball-Bearing, Spur-Gear Reducer

THE accompanying illustration shows the Albaugh-Dover Manufacturing Co.'s spur gear reducer which has a number of features that are novel.

All shafts are on ball bearings and the housing is oil tight with full and clear space inside without any obstructions such as partitions for supporting countershafts or gears on stationary or revolving discs with overhung pins, etc. It is usually comprised of three countershafts uniformly spaced about the center line of drive shafts which carries the change speed gears between the driving and the driven shafts. The three countershafts extend entirely across the length of the reducer housing between the end walls and are journaled in the end walls of the casing on their ball bearings.

The transmission gears are designed to minimize the size and reduce the total weight of the entire unit. Only one set of shafts is required for single, double or triple sets of reduction gears for the largest ratios of speed reductions usually required in one unit, making a minimum number of parts and all self-contained with equal distribution of transmission load from the driving to the driven shafts, all self-oiled from the same reservoir of oil in the full size bottom of the usually circular gear housing.

Extreme reduction is attained, it is claimed, with maximum power in the transmission by having a revolving internal gear meshing with pinions on the projected ends of the countershafts outside of the main housing. The internal gear together with the shaft couplings connected to the driving and the driven ends of the shafts are enclosed by attached housing extensions which are both safety covers and protection to the gears and bearings from dust as well as providing a covering for safety.

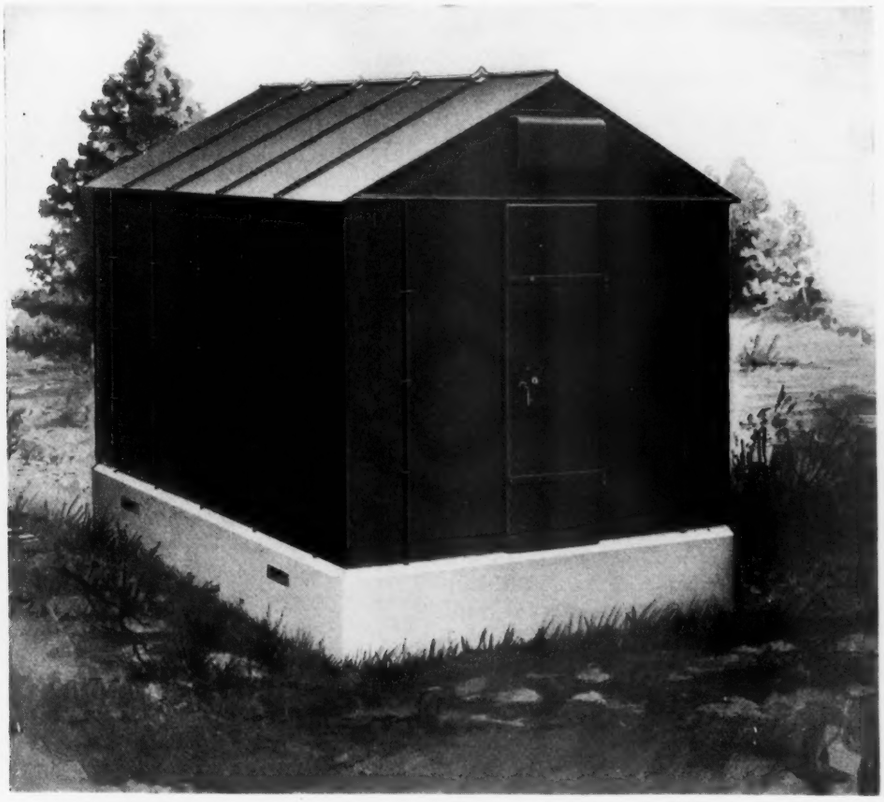
It is claimed that these reducers may be run to the right hand or left hand with equal facility by reversing the direction of the driving motor and will provide equal results in the transmission of power running constantly in the same direction or alternately reversing. The drive shaft and the driven shaft always revolve in the same direction of rotation with any ratio of reduction.

These reducers are furnished for direct connected shaft drives to conveyors or elevators, and are located between the motor and the driven unit. These units are built

for any capacity and ratios within the limits that govern gear teeth ratios.

Steel Storage Magazines

PROBABLY a large number of quarry operators are not aware that portable steel buildings especially designed for the storage of explosives have been on the market for a number of years. The accompanying illustration shows such a magazine made by Littleford Bros., Cincinnati, Ohio.



Knock-down all-steel powder magazine for quarries

Although not bullet proof this type of magazine is endorsed by inspectors and meets the requirements of state laws for the storage of blasting powders. When properly lined with brick or sand fill, these magazines are suitable for the storage of high explosives.

Littleford portable steel storage magazines are regularly carried in stock in the following standard sizes which will meet the average requirements. The rated capacities are figured with a liberal allowance (40%) for aisle space. They are shipped knocked down with all parts properly marked with instructions for erection and painted with two coats of best graphite paint.

Standard Sizes

No.	Cacapity Kegs	Cases	Dimensions Width	L'gth	H'ght	Gable	Shipping weight
S-1....	300	150	8 ft.	6 ft.	7 ft.	24 in.	1650 lb.
S-2....	500	250	8 ft.	9 ft.	7 ft.	24 in.	2000 lb.
S-3....	850	425	8 ft.	15 ft.	7 ft.	24 in.	2800 lb.
S-4....	1050	525	11 ft.	12 ft.	8 ft.	33 in.	3200 lb.
S-5....	1300	650	11 ft.	15 ft.	8 ft.	33 in.	3600 lb.
S-6....	1850	925	11 ft.	21 ft.	8 ft.	33 in.	4700 lb.

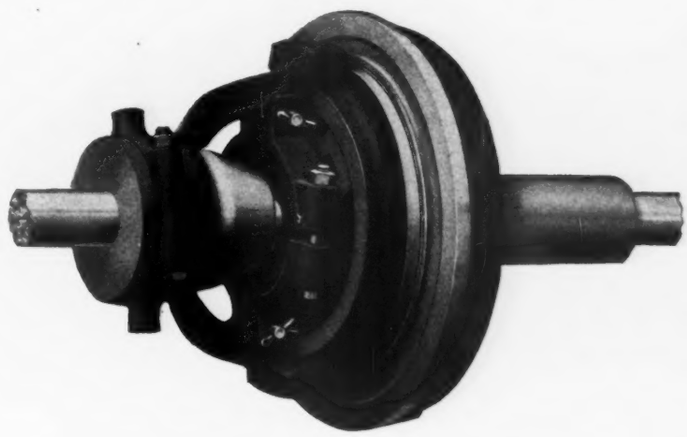
Friction Clutch

THE Lemley Model "F" friction clutch has been developed, the W. A. Jones Foundry and Machine Co., 4401 W. Roosevelt Road, Chicago, state, to meet the demand for a medium and light duty clutch which can be conveniently applied to practically any machine or countershaft.

It is claimed to have few parts, all of which are in plain view and readily accessible. No special tools are required to adjust or dis-assemble completely.

Uniform pressure on the friction surfaces is assured, it is said, at all times; the two toggles are adjusted at the same time by means of one split ring nut.

Free floating friction rings of fiber or asbestos brake-lining material are used. Model "F" is furnished as sleeve clutches, cut-off couplings, or bolted to the arm of pulleys, sprockets, gears, sheaves, etc. Other types of "Lemley" clutches are built for various classes of work.



A new friction clutch with special features

Easton Car and Construction Co.'s New Kansas City Plant

WM. E. FARRELL, president of the Easton Car and Construction Co., Easton, Penn., announces that his company, in order to better and more effectively serve the territory between the Mississippi River and the Rocky Mountains, has formed and incorporated the Easton Car and Construction Co. of Missouri, with headquarters at Kansas City. In this city a manufacturing and distribution plant will be established at once.

F. W. Good has been made vice-president of the company and sales manager in charge of the Kansas City office. Mr. Good is an engineer of many years experience with quarry and mine transportation problems.

The offices will be at 211 Scarritt Arcade Bldg., which Mr. Farrell will make his own headquarters for some time to come. Mr. Farrell is the chairman of the Manufacturers' Division of the National Crushed Stone Association.

The New Standard Scale and Supply Corporation

R. H. CHAPPEL was recently elected treasurer and general manager of the Standard Scale and Supply Corporation with general offices at Pittsburgh, Penn.

This corporation, which is entirely new and separate from the old Standard Scale and Supply Co. of Beaver Falls (now out of existence), manufactures railroad track and truck scales, the narrow drum concrete mixer and handles contractor's equipment.

It has its own branch offices, warehouses and stores in Pittsburgh, New York, Philadelphia, Chicago and Cleveland.

South Dakota Attorney General Says State Cement Plant Defects Greatly Exaggerated

"DAMAGES to the state cement plant through alleged irregularities have been grossly exaggerated," declared Attorney General Buell F. Jones recently. He is investigating grounds for suits, by the state, against the construction engineer; the former secretary of the cement commission, and Rapid City firms which sold supplies to the cement commission and others.

"I am not saying that everything is as it should be," continued South Dakota's attorney general, whose office will handle all actions, if such be instituted.

"But they are by no means as bad as they have been made to appear. The report of the investigation committee was exaggerated. Members of the investigation committee perhaps developed prejudices.

"At any rate, damages to the plant were played up out of proportion to the actual situation."

"I believe the state has a splendid cement plant," Mr. Jones added, "and I don't suppose any plant of its magnitude ever commenced operations but what had more difficulty in getting started than this plant has had.—*Sioux Falls Press.*

Building Sand and Gravel Plant at Lewisville, Arkansas

A SAND and gravel plant is being installed by the Merriwether Sand and Gravel Co. of Shreveport, La., at a site four miles north of Lewisville, Ark. A right of way for a railroad spur from the plant to the city has been secured and work of construction commenced. It is estimated that the plant will have a capacity of 25 to 30 carloads a day.

Capacity of Hewitt, California, Crushing Plant Doubled

NEW equipment has been installed at the Hewitt, Calif., plant of the Consumers Rock and Gravel Co., Los Angeles, doubling its capacity and costing $30,000. The improvement consists of the installation of two conveyor belts, each 500 ft. long.

Under the former method of operation, the material was handled by tram car and cable hoist and required the services of 22 men. The new system of handling, according to the *Lankershim (Calif.) Press,* only five men are necessary for the same amount of work. The gravel is loaded by a steam shovel onto one of the belt conveyors (which can be shifted to position desired in the pit) which carries the material to the other 500 ft. conveyor, which takes the gravel up an incline to the top of the plant. At the top of the incline two 75 ft. conveyors transport the rock to the crushers.

CREATION OF GOOD WILL

THE intelligent merchandiser is not content merely to exchange goods for money. He seeks to create an intangible tie of mutual satisfaction and of eagerness to continue a beneficial and pleasant relationship.

Goods may be sold in a manner that leaves bitterness, resentment, and dissatisfaction in the heart of the customer. Buying in such cases is done under duress. Sooner or later the customer looks for another source of supply.—A. J. Wolf in U. S. Commerce Reports.

The plant is operating 12 hours per day, employs a force of 40 men and has a capacity of 200 yd. of sand and gravel.

New Gravel Company to Operate on Allegheny River

A NEW company, known as the Allegheny River Sand and Gravel Co., capitalized at $50,000, has been organized at Parker's landing, Penn., and is headed by Capt. John H. Hudson of Pittsburgh.

A dredge 30x125 ft. and flats 20x90 ft. are under construction for the company and an eight-ton loading derrick will be erected.

Dredging operations will start about May 15 in the Allegheny river above Oil creek near Oil City, Penn. According to local papers, the company will employ 25 men and produce 1500 tons of sand and gravel daily.

Erecting Sand and Gravel Plant at Endicott, Nebraska

THE Fairchild Brothers Clay Products Co. is installing a pumping and gravel washing plant at its plant just west of Endicott, Neb. The improvements complete will cost about $10,000. A special suction pump will pump gravel from the creek bed and from a pit nearby into a settling box for washing.

The plant is to be operated by electrical power, and the transformer on the power line running to the brick yards is being changed so that the voltage it can handle will be increased from the present 13,000 v. to 23,000 v.—*Lincoln (Neb.) Star.*

Errata

OUR attention has been called to two errors in describing sand and gravel plants in the April 18 issue of ROCK PRODUCTS. On page 39, describing the plants of the Granite Sand and Gravel Co., Indianapolis, the hoists used are made by the Thomas Elevator Co., Chicago, and were installed by Sauerman Bros. Co., but not manufactured by them. On page 68, the clamshell bucket used by the Penn plant of the Charles Warner Co., at Tulleytown, Penn., is a 3-yd. Blaw-Knox bucket and not a 2½-yd. Hayward, as stated in the article.

Silica Sand and Gravel Industries at Pacific, Missouri, Growing

ON the west edge of St. Louis county, Missouri are large deposits of silica rock. At Pacific, Mo., the deposit is over 100 ft. deep and extends several miles north and west. The first developments of these deposits were made in rather recent years on a small scale and the industry has gradually expanded to its present state.

One of the silica sand plants now operating at Pacific is that of W. W. Goran. This plant uses electrical power and crude oil for drying. The silica is mined, crushed, screened, dried and shipped to St. Louis, Kansas, Oklahoma and Indiana. About 300 tons of glass, foundry and polishing sand are produced at the plant daily.

A larger and newer plant, that of the Pioneer Silica Products Co., has recently been built there. The first unit of the plant is now in operation and other units will soon be added. At this plant the silica is mined, crushed and dried, then ground in a pebble mill producing silica sand "flour" used chiefly for filler. An air separator is used for grading the product.

At Pacific are also large sand and gravel deposits in and along the Meramec river. Two plants are now in operation, another is being erected and others are planned.

The St. Louis Material and Supply Co. dredges sand and gravel from the river bed and bottom land on the shore opposite its plant and produces 50 carloads of washed and screened sand and gravel daily.

The Denton Service Sand and Gravel Co. pumps raw material from a river bottom field covering several acres. The bed of gravel has a uniform depth of about 35 ft. The gravel is pumped onto a belt conveyor and elevated to the plant, where it is washed and screened and diverted into storage bunkers.

Ontario Gravel Company Gets Permission to Build Plant

AFTER having its application passed by the Chamber of Commerce and council last year and then again rejected by both bodies, the Bridgeburg Sand and Gravel Corporation, represented by Richard M. Graham, has been granted permission by the Bridgeburg, Ont., council, subject to the approval of the Queen Victoria Park Commission, to establish a sand and gravel plant along the banks of the Niagara river.

At the present time all sand and gravel used on the Niagara frontier has to be brought from a considerable distance, and the company, in securing the necessary consent, claims it will meet a long-felt need.—*Buffalo (N. Y.) Times.*

New Cement Plant for Australia

AN Australian cement company has recently entered into an agreement with the New South Wales Government to supply large quantities of cement and has commenced the erection of large works at Charbon. A huge water reservoir is to be constructed, formed by an arched concrete dam, 50 ft. high, 10 ft. thick and 230 ft long. When filled, the storage capacity will be over 45,000,000 gallons and will suffice to operate the whole works for nearly two years without further rain falling. An aerial ropeway is to be constructed three miles long capable of delivering 100 tons of limestone per hour to the plant. It is expected that the plant will be in operation in about 18 months.—*New York Times.*

Columbia Cement Company Plans Two Plants in California

THE Columbia Cement Co. has plans under way for the erection of two cement plants in developing its deposits in the Imperial Valley in San Diego County, one at San Diego and the other in the vicinity of Los Angeles, Calif., according to an announcement by Fred A. Ballin, president of the company, noted in the *Los Angeles Daily News.*

River Equipment Taken to New LaGrange, Mo., Gravel Plant

THE new sand and gravel plant of the Missouri Gravel Co., a subsidiary of the Moline Consumers' Co., at LaGrange, Mo., is about completed and river equipment, including the steamer *Pearson,* the dredge *Hobson* and two barges, have been transferred to it from the Moline, Ill., plant of the company.

James P. Pearson, president of the company, accompanied the boats to supervise the inauguration of operations. The plant will have an initial capacity of 500 to 700 cu. yd., and Ray Bergenson will be superintendent.

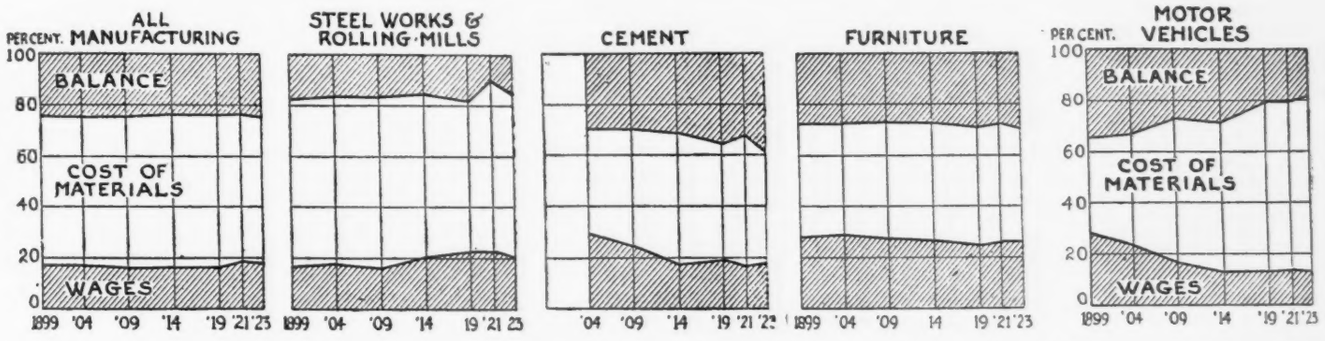
Additional barges will be taken to the plant later by the steamer *Marquette.* This steamer will return to Moline, while the *Pearson* will remain at the new plant permanently.

Cost and Surplus Charts

THE charts below, which are a part of those published in the April issue of the *Monthly Review* of the Federal Reserve Bank, New York City, are very interesting. They purport to show the relation between cost of materials, labor costs, and surplus, or gross profits, in some of the principal industries, including portland cement. The text in connection with the charts follows:

"Despite the prevailing high level of wages, figures recently made public from the 1923 Census of Manufactures indicate no important change in recent years in the proportion of the total value of manufactured products represented by wages. While considerable variations have occurred in individual industries, due to special conditions that for manufacturing as a whole the within those industries, it seems apparent higher wage rates have been largely offset by increased output of goods per worker, so that fewer workers have been required, and the aggregate wage bill in consequence kept down.

"The diagram shows for census years since 1899 the percentage of the total value of manufactured products paid out in wages and compares them with the percentages paid for materials, and with the balance left for salaries, interest, selling expense, profit, etc., both for all manufacturing industries and for various selected industries. It will be seen that, for all industries combined wages come second to materials as a major item of cost. The proportion varies, however, in the separate industries; it is comparatively high in industries involving relatively skilled labor, such as jewelry, glass, and furniture, and low in industries requiring a large amount of unskilled labor, such as meat packing, and iron and steel making. These proportions likewise often vary considerably within the same industry over a period of years, as indicated in the diagram, particularly by the figures for the automobile, cement, and glass industries."



Percentages of total value of manufactured products represented by wages and cost of materials. Balance represents percentage remaining for interest, dividends, taxes, selling expenses, etc.

Virginia Portland Cement Company's Plant to Start Operations in August

THE plant of the Virginia Portland Cement Co., South Norfolk, Va., will begin turning out 3000 bbl. of cement daily after its opening early in August. E. Posselt, vice-president and general manager, told the Engineers' Club of Hampton Roads at its annual meeting recently.

He described the processes in the manufacture of cement, telling how marl will be taken from a point on the Nansemond river where machinery for the purpose is now being installed. The plant at South Norfolk will be modern in every particular, he continued, and will compare favorably with any other plant in the country.

The plant will consume 250 tons of coal each day and will have a storage capacity of 100,000 bbl. of the finished product, Mr. Posselt said.

(The Virginia Portland Cement Co. is a subsidiary of the International Cement Co. of New York City.)

Mr. Posselt's talk was illustrated by moving pictures showing methods of obtaining the raw materials and the process of manufacture.—*Norfolk (Va.) Ledger-Dispatch.*

New Missouri Gravel Company Begins Producing

THE sand and gravel plant which has been under construction at Bagnell, Mo., on the Osage river has begun production and has an initial capacity of about 20 carloads of washed and graded product per day. The sand and gravel will be taken from the river by a barge equipped as a dredge and transported by pontoons to the screening plant.

According to local papers, the company has been incorporated as the Osage Gravel Co. of Jefferson City, Mo., with a capital stock of $80,000 and is composed of 12 stockholders. The officers are David H. Leitch, president; V. V. Kirkpatrick, vice-president; Clarence W. Curtis, secretary; Stratton Shartel, treasurer, and V. H. Essen, general manager. John W. Butler is superintendent. The offices of the company are in the Trust Bldg., Jefferson City.

News of All the Industry

Incorporations

Superior Concrete Co., Marine City, Mich., capital $50,000.

Wilson Concrete Products Co., Detroit, Mich., capital $15,000.

Cambridge Cement Stone Co., Boston, Mass., capital $200,000.

Bromide Crushed Rock Co., Bromide, Okla., capital reduced from $150,000 to $50,000.

Peerless Concrete Products Co., Seattle, Wash., stock increased from $8000 to $10,000.

Mica Products Corporation, Wilmington, Del., $1,000,000. (Corporation Service Co.)

Balfour Quarry Co., Wilmington, Del., $100,000. (Delaware Registration Trust Co.)

Utah Sand and Gravel Products Co., Salt Lake City, Utah, capital $10,000. J. E. Hatch is president.

Black Rock Asphalt Corporation of Kentucky, Wilmington, Del., capital $200,000. (Corporation Service Co.)

North Carolina Amiesite and Stone Co., Wilmington, Del., $6,200,000. (Delaware Registration Trust Co.)

Security Portland Cement Co., Wilmington, Del., capital $500,000. To manufacture cement. (Corporation Service Co.)

Gravel and Sand Corporation, St. Louis, Mo., capital $50,000; John K. Goin, 5115 Washington boulevard, A. S. Roberts and others.

Beebee-Howard Gravel and Construction Co., Lubbock, Texas, capital $5000, by W. G. Beebee, C. E. and C. H. Howard.

D. P. Warner and J. G. Royce have engaged in business at 1300 West 58th street, Los Angeles, Calif., as the Western Plaster Co.

St. Joseph Cinder Block Co., St. Joseph, Mo., capital $30,000, by N. D. Biles, 1422 South Sixth street, N. D. Biles, Jr., and others.

Aldercreek Cement Products Corporation, Forestport, N. Y., has changed its name to Summit Duntile Corporation of Boonville, N. Y.

Porterville Lime Rock Co., San Francisco, Calif., with a capital stock of $10,000, by M. Martinson, W. H. Knight and W. A. Powell.

Crushed Stone and Products Co., Troy, N. Y., $5000, by E. Ott, I. C. Norton and H. D. Bernhard. (Attorneys, Taylor and Taylor, Troy.)

Avalon Gravel Co., Avalon, Miss., capital stock $30,000, by Ashleigh Harleston and J. H. Hobson, Greenwood, and Lord Harleston, Avalon.

Better Block Co., Milwaukee, Wis., $10,000, by Paul and Alfred Hollmann and Otto Schwinn to manufacture and deal in concrete products.

Ernest E. Bruce Sand and Gravel Co., Casper, Wyo., capital $50,000. George F. Sternberg, John W. Guy and M. F. Stapleton are the directors.

Sullivan Stone Co., Somerville, Mass., 50 shares no par value. President, Wm. J. Sullivan, 50 Dartmouth street; treasurer, Roger H. Ducer.

Los Angeles Cast Stone Co., Sawtelle, Calif., capital stock $50,000, by J. Bridge of Santa Monica, L. P. Conway and Alex Mattson of Sawtelle.

Tru-Ston, Inc., Portland, Ore., capital $30,000, to manufacture concrete and cement products, by Harry W. Earl, J. A. Jackson, T. J. Hayes and others.

Sand and Gravel Trucking Co., Inc., Jersey City, N. J., capital $25,000; directors, Stevan Collins, 179 East 31st street, F. Fenimore and E. G. Neimark.

Massachusetts Cement Block Co., Watertown, Mass., capital $50,000, by Louis Freedman, president, Dorchester; Maurice and Jacob Freedman, 18 Devon street, Roxbury.

D. G. Bevis and Dan R. Brown have engaged in business on the corner of San Fernando road and Brantford avenue, Los Angeles, Calif., as the Boulevard Rock and Gravel Co.

Black Diamond Graphite Corporation, Fort Lee, N. J., 100 shares no par value. L. C. Burdett, Palisades, and F. Fornato, Brooklyn, N. Y. (Attorney, L. C. Burdett, New York.)

Carrcroft Development Co., Wilmington, Del., capital $100,000, to manufacture cement, lime and plaster. F. L. and M. E. Mettler, P. M. Gilkey. (Franklin L. Mettler, Wilmington.)

Lafayette Stone Co., Lafayette, Ind., 200 shares of no par value common stock for the purpose of quarrying and crushing stone. The incorporators are Milton G. Laverenz, John M. Lugar and Wayne S. McConnell.

Aurora Gravel Co., Aurora, Ind., formed from the reorganization of the firm of Smith and Cummins, sand and gravel producers of Aurora. Sanford Cummins has a half interest in the company with Cecil Shields and Herbert O. Cristy.

Connecticut High Test Sand and Gravel Co., Inc., Hamden, Conn., authorized capital of $50,000, to begin with $5000. Incorporators are Fausto Bertolini of Woodbridge; Prospero Calosso, Joseph Marioni and John Arborio, all of New Haven.

Los Gatos Sand and Gravel Co., Los Gatos, Calif., organized by A. E. and H. C. Tiffany. Will erect a plant on creek bed property leased by them near city to be in operation about May 1. Plant will have an initial capacity of about 150 yd. daily.

Coast Lumber Co., Fort Lauderdale, Fla., capital $50,000. Will build plant and manufacture waterproof concrete blocks along with lumber business. Officers of the company are M. L. Fleishel, president; N. T. Sollar, vice-president and general manager; Jack O'Brien, secretary, and G. V. Brooker, treasurer.

Madison Sand and Gravel Co., Hamilton, N. Y., has been organized by John G. Carpenter of Rochester, Prof. H. O. Whitnall of the Colgate University faculty and Raymond E. Brooks of New York to produce washed sand and gravel. The company has secured property along the New York, Ontario and Western R. R. a mile north of Bouckville and engaged E. H. Rawlins of New York as manager. The office of the company will be at Hamilton.

Cement Products

F. L. Scull, Conway, Ark., concrete contractor, has opened a cement block plant at Morrilton, Ark.

Concrete Products Co., Cedar Rapids, Iowa, has begun the erection of a $4000 addition to its plant.

Gibralter Cement Block Co., Indianapolis, Ind., has established a plant at Harding street and Kentucky avenue.

National Cement Products Corporation, Benton Harbor, Mich., had its recently built plant destroyed when a young cyclone hit it.

Oregon Gravel Co., Salem, Ore., has contracted with the city of Portland, Ore., to make 24,500 concrete water meter boxes for $28,665.

The Stresbilt Tile Co., Alexandria, Pa., will move to its new plant on Cameron street, additional equipment will be installed in the plant, giving the company a larger output.

Merritt Concrete Products Co., San Jose, Calif., of which James C. Merritt is president, and M. B. H. Miller, sales manager, has opened a sales office in the Monadnock Bldg., San Francisco, Calif.

Valley Concrete Tile Co., which has established a plant at Tehama, Calif., is employing 50 men and will soon double the force. Now working on an order for 100,000 ft. of concrete irrigation pipe.

Paducah Concrete Products Co., Paducah, Ky., will erect 24x120 ft. building, install Universal block and tile machines. Plant will have a capacity of 1000 blocks per day. Lacy Peyton, 511 Trimble street, is proprietor.

Philpot Construction Co., Pine Bluff, Ark., has erected a plant to manufacture cement roofing tile. The site of the plant is at the foot of Tennessee street on the Arkansas river front. Sand from the river will be used as aggregate for making the tile.

J. W. Peters, Burlington, Wis., has purchased the barn, blacksmith shop and office building of the defunct Koier Sand and Gravel Co. of the Sheridan Trust Co. of Chicago and will move them to the gravel pit which he is developing near the Racine county pit. He is contemplating the installation of equipment for the manufacture of concrete blocks

Sand and Gravel

Bailey Gravel Co., Indianapolis, Ind., has opened its plant at 54th street and White river.

Scisco and McDowell Gravel Co., Asbury Park, N. J., has opened new pits to supply sand and gravel for a municipal contract awarded recently.

Acme Gravel Co., San Francisco, Calif., has let the contract for erection of timber gravel bunkers, a scale house and office quarters at Jefferson and Leavenworth streets at a cost of $15,000.

Augustus J. Ilg has instituted equity proceedings against his partner, Earl Bucks, seeking a dissolution of the Pricetown Sand and Stone Co. of Reading, Penn.

Kuster and Waterbury, Corona, Calif., are erecting a sand and gravel washing and crushing plant to cost approximately $10,000. The plant will begin operation around the first of May.

Ferguson Gravel Co., Indianapolis, Ind., is constructing two wooden silo gravel bins and installing a new 80-h.p. motor for hoisting, giving the plant a capacity of 600 yd. a day, according to Fred Donnelly, manager.

Elliott C. Risley, Dixon, Ill., has rebuilt his sand and gravel plant and installed new equipment, expending $5000 and tripling its output. Sand and gravel is taken from the bed of Rock river and 250 yd. of washed and graded product are produced at his plant now daily.

Harston Sand and Gravel Co., Dallas, Texas, has moved its offices to new quarters in the Santa Fe Terminal building. The company's plant is located at Tarrant and a special train is operated from the pit to Dallas. Dan Harston is president and Clyde Kraft, general manager of the company.

Buffalo Gravel Co., Buffalo, N. Y., is reported to be negotiating with the L. D. Smith Dock Co. to have one of its steamers equipped with an 18-in. centrifugal pump for loading and unloading sand and gravel. The boat to be equipped is 260 ft. long and has a capacity of 2300 tons.

Superior Gravel and Sand Co., Inc., Superior, Neb., has opened a new pit and erected a washing and screening plant to operate it. At a recent meeting of the company the officers elected were: Wm. Kiethley, president; L. P. Gregory, vice-president; J. D. Phelps, secretary; A. C. Phelps, treasurer.

Standard Sand and Gravel Co., Wheeling, W. Va., will erect storage bins structure 40 ft. high and 400 ft. long to cost $15,000. The company was organized three years ago and has enjoyed a splendid business. The officers are: W. M. Armstrong, president; W. H. Klieves, vice-president; Edgar Aaron, secretary; R. W. Marshall, treasurer; J. M. Stark, general manager, and W. T. Stump, superintendent.

Moraine Sand Co., Dayton, Ohio, has been awarded the contract to furnish the city of Dayton 10,000 tons of asphalt sand for this season's street repairs. The company's plant is located just south of Dayton along the C. C. C. & St. L. railroad and has a capacity of 125 tons of screened sand per hour. The sand is excavated by a Blaw-Knox clamshell bucket, operated from a whirley, and dumped into a hopper which feeds it to a Webster conveyor by which it is carried to three vibrating screens. The sand is dry screened and conveyed to the storage bins.

Quarries

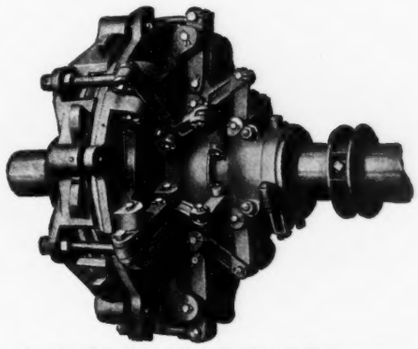
White Marble and Terrazzo Co., Lee, Mass., has tentative plans for rebuilding the portion of its plant recently destroyed by fire at a loss of $70,000.

The limestone quarry on the Carlos Ralph farm near Neelyville, Ohio, has been leased by the State Highway Department to produce crushed stone for road construction.

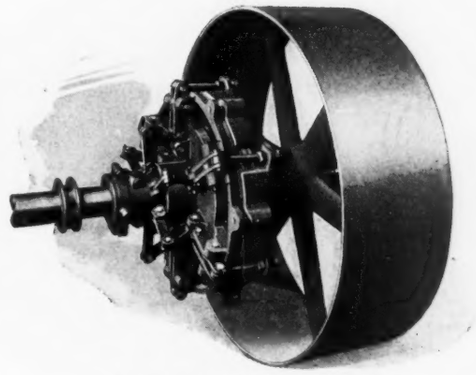
Cold Springs Granite Co., Cold Spring, Minn., has bought the Anderson Granite Co. at Morton, Minn. The quarry at Morton contains 52 acres of granite in two hills about 100 ft. high.

Belvidere Stone Co., Belvidere, Ill., has installed a new crusher and elevator at its plant west of the city and begun operations for the season,

ALLIS-CHALMERS FRICTION CLUTCHES



A. C. Friction Clutch Cut-Off Coupling Type "C"



A. C. Friction Clutch Pulley Type "C"

THE Allis-Chalmers Type "C" Friction Clutch has proven entirely satisfactory for extra heavy service and under conditions that called for a heavier constructed clutch than our Type "A."

The Type "C" has been adopted as standard equipment for driving our heavy Rock Crushing Machinery and also is used for driving heavy Mining Machinery such as Ball and Rod Mills. It also is used for the heavy drives in Crushing Plants.

The outstanding features of the Type "C" friction clutch is its rugged design and method of mounting the pulley to clutch. The clutch arms and levers are of steel and both the spider and driver are made plate center eliminating the arm construction found in most clutches.

By casting a flange on the pulley hub the length of which is equal to the pulley face the pulley is bolted to the clutch driver with turned bolts, making it possible to change pulley if necessary without discarding the clutch.

The Type "C" mounting is preferable to the Type "A" as it provides a bearing the full length of the pulley face, bronze bushed and recessed for an ample supply of grease.

Another advantage of this type clutch is the clutch lever construction which enables these clutches to be used for high speeds.

These clutches are regularly furnished with Thermoid lining on the friction surfaces.

We make Type "C" clutches in sizes from 21" to 48" ranging in power from 55 to 385 H.P. at 100 r.p.m.

Send for a free copy of our new Friction Clutch Catalog No. 2068 which gives complete information about these and other clutches.

Address Inquiries to the Transmission Dept.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

increasing production to 250 tons of crushed stone daily. John Fair is in charge of operations.

Rock Products Co., Carson City, Nev., at the annual meeting of its stockholders endorsed the offering of an additional $50,000 worth of preferred stock to provide for more extensive operations. C. E. Lough is president of the company, Frank H. Norcross, secretary, and W. J. Walmsley, general manager.

Improvements at the rock quarry of the Harbor Department on Catalina Island, Calif., are to be made. A new steam engine for the electric light plant will be installed and a revolving steam shovel substituted for the present railroad type shovel. At present about 900 tons of rock, used chiefly for building the sea wall in the outer harbor, are being produced daily.

Lime

Western Lime and Cement Co., Milwaukee, Wis., expect to rebuild the plant at Nasbro and make it a modern and up-to-date lime plant.

Lively Lime Products Co., Gold Hill, Ore., recently took a 10-year lease on Kane's creek limestone quarries three miles southeast of Gold Hill and has dismantled the old kiln on the property and erected a new 10-ton kiln. The company also has contracted to furnish Salem paper mills with limestone and has begun operations, employing 12 men. The company was originally formed by M. S. Johnson, C. W. Courtney, J. M., K. V. and J. W. Lively.

Silica Sand

Gardner Sand Co., Ridgway, Tenn., has sold out to the C. M. Fox Sand Co., 1020 Marine Bank Bldg., Buffalo, N. Y.

Gypsum

Standard Gypsum Co., San Francisco, Calif., has leased offices in the Alaska Bldg., Seattle, Wash., to be used in connection with operations there.

Personals

Rudolph P. Miller, consulting engineer, has removed his offices to 342 Madison avenue, New York City, where he will serve his clients in matters of building construction and materials, fire protection and safety, legal requirements, appeals, zoning and arbitration.

F. M. Whitfield has been appointed district engineer in charge of Portland Cement Association work in Tennessee, with offices in the Baird-Ward Bldg., 150 Fourth avenue, Nashville, Tenn. Mr. Whitfield has been connected with the association as field engineer since December, 1923, previous to which he filled various positions with eastern and southeastern organizations engaged in road and street improvement. The association's Memphis office has been moved to Nashville to obtain a more central location.

Manufacturers

Mullins Body Corporation, Salem, Ohio, has opened an office in Detroit, located in the General Motors Bldg. The office is under the management of Frank J. Burrows.

Chemical and Vacuum Machinery Co., Inc., Buffalo, N. Y., announces that H. E. Neubauer, formerly assistant chief engineer of the Buffalo Foundry and Machine Co., later vice-president of O. S. Sleeper Co., Inc., has become associated with its organization as chief engineer.

Harnischfeger Corporation, formerly Pawling and Harnischfeger Co., Milwaukee, Wis., announces the removal on May 1 of its Pittsburgh sales office from the Fidelity Bldg. to 612 Farmers Bank Bldg., Fifth avenue and Wood street. A. J. Dreyer is district manager and M. B. Bradley is sales manager at this office.

Brown Hoisting Machinery Co., Cleveland, Ohio, announces the following appointments in its sales organization: J. P. Chase, sales manager; J. F. Poland, manager of Chicago office; E. W. Taylor, manager of Pittsburgh office. In addition to his duties as sales manager, J. P. Chase will be in charge of Cleveland division sales.

Pennsylvania Pump and Compressor Co., Easton, Penn., announces that T. J. Barry, Park Bldg., Pittsburgh, Penn., has been appointed district representative for the Pittsburgh territory for the company's line of air compressors and pumps. The company also announces the appointment of H. P. Rogers district representative for the Cleveland territory, with office at 508 Leader-News Bldg., Cleveland, Ohio.

Ingersoll-Rand Co., New York, has arranged with Carels Brothers of Ghent, Belgium, so that the Belgian concern will have the right to manufacture the Ingersoll-Rand solid-injection type of oil engine. Carels Brothers, organized in 1875, after successive periods of expansion, are now officially known as the Societe d'Electricite et de Mecanique. It is interesting to note that Europe, the land in which the heavy-oil engine originated, has now come to America for developments of the engine.

Smith Engineering Works, Milwaukee, Wis., has begun the construction of a new factory at Lake and Holston streets on the north edge of the city. The present plant of the company will be discontinued when the new one is completed, giving the company twice its present output. The company was founded in 1906 by the late Thomas L. Smith and Paul W. Post. The present officers are: Charles F. Smith, president and treasurer; Irving R. Smith, vice-president; Harold E. Smith, secretary.

Robins Conveying Belt Co., New York, announces the removal of its southwestern branch office to 421 H. W. Hellman Bldg., 356 South Spring street. The company will continue to carry a stock of its idlers, pulleys, takeups, pillow blocks, etc., in Los Angeles to assure prompt service in the supplying of various belt conveyor needs. J. B. Wood Tire and Rubber Co. at 505 East Third street, Los Angeles, continues to be the company's representative in southern California in the sale of Robins conveyor and elevator belts only.

Trade Literature

The Thew Shovel Co., Lorain, Ohio, has issued a pamphlet illustrating the special features of its steam shovel.

Gifford-Wood Co., Hudson, N. Y., has issued bulletin N. 101 featuring its trolley bucket elevator. Complete description accompanied with illustrations is included in this bulletin.

Pennsylvania Pump and Compressor Co., Easton, Penn., has issued a well illustrated 16-page bulletin No. 206 presenting its line of double suction, single stage centrifugal pumps.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., has issued a leaflet describing in detail its type CS squirrel-cage induction motors as furnished today as a result of 33 years of development.

The Wood Shovel and Tool Co., Piqua, Ohio, has published what it calls a text book on shovels, spades and scoops. Descriptions, specifications and prices of the company's molybdenum-steel shovels is presented therein.

Hardinge Co., Inc., York, Penn., has issued bulletin No. 21 on "Rock Dusting of Coal Mines." A study of the problem of rock dusting of mines is made and the company's stationary pulverizing plant and portable pulverizer and duster are presented.

Celite Products Co., Los Angeles, Calif., has published a revised issue of its bulletin No. 106 on the insulation of boilers. Considerable additional information on the insulation of stacks and powdered fuel furnaces is included in this revised edition.

Ruston and Hornsby, Ltd., Lincoln, Eng., has published catalog No. 4712, its new model, full circle excavator No. 10, which is convertible into crane navvy, dragline and grabbing crane. The bulletin is attractively illustrated and the excavator well described.

The Hill Clutch Machine and Foundry Co., Cleveland, Ohio, has just issued bulletin T-221 describing its "Industrial Type" spur gear speed transformer. A table of the ratings of the seven sizes of this type of the company's speed transformers is included in the bulletin.

The Asphalt Association, 441 Lexington avenue, New York, have had reprints made of the article by Frederick Alan Thompson "From Mastodon to Motor," published in the March number of the *World's Work*. This article is the story of the history of the utilization of asphalt told from an entertaining point of view.

Harnischfeger Corporation, Milwaukee, Wis., has recently issued a 64-page book entitled "Forty Years of Progress," giving the history of this organization with photographs of the entire plant and personnel as it is today and illustrated descriptions of its products.

Link-Belt Co., Chicago, Ill., has just published a book describing and illustrating its rivetless chain. The text treats of the assembly and disassembly of this simple chain and describes many of the uses to which it can be put. Tables of weights and strengths supplement the text.

Sullivan Machinery Co., Chicago, Ill., has recently issued a number of new bulletins on Diamond and hammer drills. Bulletin 80-A describes the "C" and "CN" mounted Diamond core drills with gas engine drive designed for use in rough country and where fuel and water are scarce. Bulletin 81-G describes in detail the new model "DU-48" rotating water stopers. Bulletin 81-F is a new edition of the Sullivan catalog on rotator hammer drills. Bulletin 81-E is a new edition of the company's bulletin on its "DW-64" water jet mounted hammer drills with complete description and illustrations of its performance. A supplementary bulletin No. 81-EA describes special fixtures for adapting this drill for use in line drilling and channeling.

Birdsboro Stone Company Has Largest Blast

MORE than 500,000 tons of rock were displaced when the Birdsboro Stone Co. of Birdsboro, Penn., set off the largest dynamite blast in the history of the organization. Forty-five tons of dynamite were used.

The quarry, located in the Hopewell hills back of Monocacy, proved the center of attraction for many motorists who desired to witness the demonstration. When the blast was set off the entire hillside seemed to rise, pause for a second and crumble in a dense cloud of dust, a broken mass easily moved by the huge steam shovels of the company and loaded into cars.

One year of drilling through solid rock was necessary for the success of the blast. Nineteen well-holes, 8 in. in diameter with an average depth of 260 ft., were required to move the mountain side. These major holes were placed 45 ft. from the edge of the cliff and the same distance apart. Many other minor blasts were included in the charge.

The work of placing the dynamite was under the personal supervision of Samuel Shirey, the company's powder expert, who also set off the charge. The placing of the holes was under the supervision of William Mohr, the quarry foreman. William H. Kelly is the superintendent.—*Reading (Penn.) Tribune.*

Oregon Gravel Company Buys New Property

NEGOTIATIONS for the purchase of 10 acres of land at Eugene, Ore., on the Willamette river east of Grand street, have been made, according to a local paper, between the Eugene Sand and Gravel Co. and a group of local men, owners of a large piece of ground in that district. J. R. McKy, owner of the Eugene Sand and Gravel Co., stated that the capacity of the plant will be doubled. A new crusher, hoists and other equipment have been ordered and when installed will give the plant a capacity of 200 to 300 yards daily. The total investment will be about $15,000.